

# CONNECTING DENTAL TECHNOLOGY Laboratory

FMC CONNECTING DENTISTRY

Summer 2025 / Volume 19 / No 3

## ANATOMY OF AESTHETICS

Understanding tooth  
layers for natural results [p.34](#)



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by government [p.8](#)

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TWO HOURS' ENHANCED CPD INSIDE THIS ISSUE

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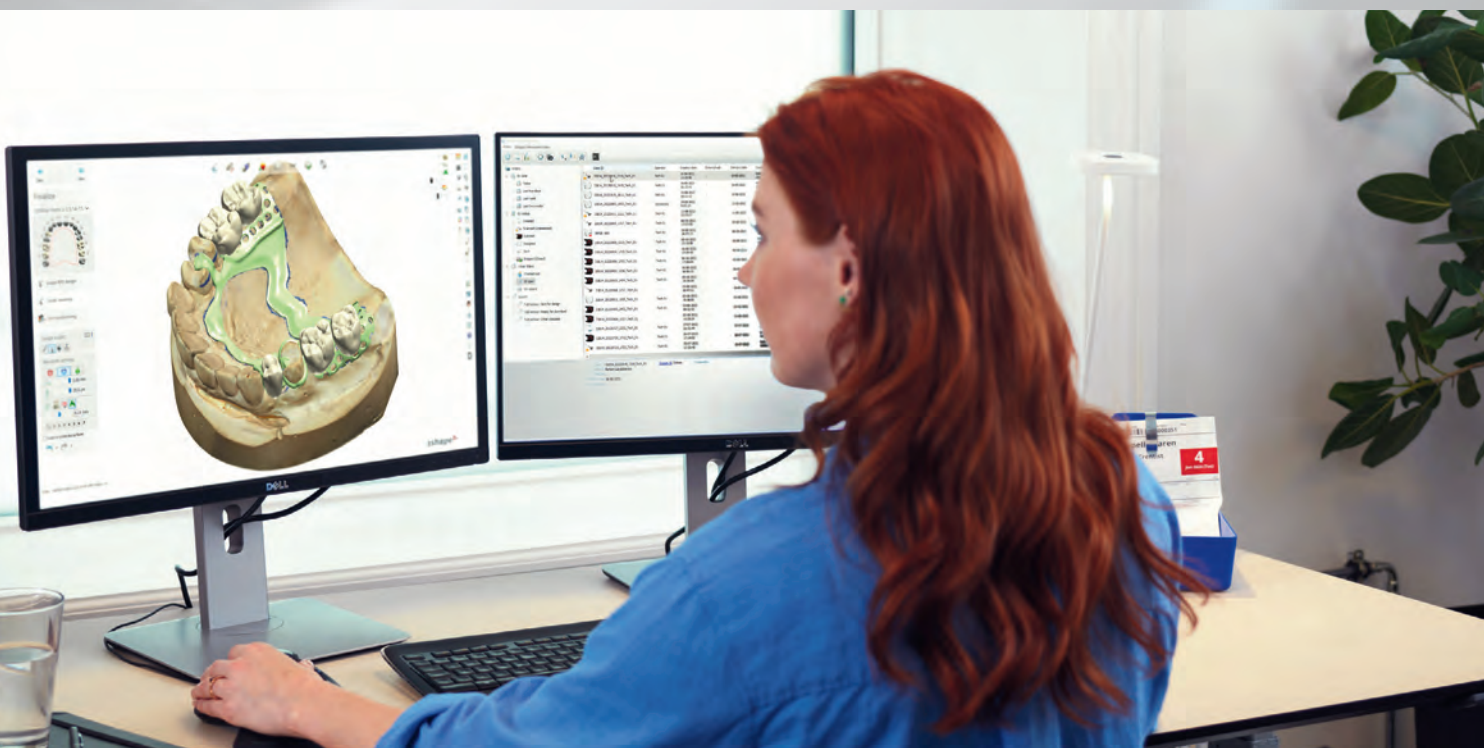


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# Change in motion

**MATT EVERATT**

Editor-in-chief

In this issue, I wanted to share a little about the ongoing work we've been doing behind the scenes of our profession's regulatory environment.

You may have seen our recent efforts with the General Dental Council (GDC) and the Medicines and Healthcare products Regulatory Agency (MHRA) to help shed light on how we, as dental technicians, are currently regulated.

We are now a year on, and we have still not had a response from the GDC, despite the regulator telling us it would respond.

We have, therefore, submitted a freedom of information (FOI) request to the GDC asking for details of any correspondence it may have had with 'stakeholders' in the hope of receiving an explanation for why it seemingly wants to keep its policy hidden from us.

This was an important step in our continuing efforts to understand exactly how we are regulated, how decisions affecting dental technology are made, and to ensure our profession's voice is properly heard.

It is a conversation that needs to be open, transparent and informed.

## MOVERS AND SHAKERS

As I write this, the *Dentistry* Top 50 list has just been announced, and I was thrilled to see three people from the dental technology appear: Nina Frketin, Andrea Johnson and Bill Sharpling.

This edition sees the return of *Laboratory* Leading 20, too. Not without controversy, these lists are brought together to celebrate the movers and shakers within our profession.

As a result, the *Laboratory* team is urging its readers to nominate a colleague or peer who they feel should be included in this year's *Laboratory* Leading 20 list. Simply email [newsdesk@fmc.co.uk](mailto:newsdesk@fmc.co.uk) with your nominations and give a few good reasons why you think they should be considered.

As always, this magazine remains a platform for your stories, your innovations, and your experiences.

I'd encourage you to get involved, share your thoughts, and be part of the dialogue as we collectively shape the future of dental technology in the UK.

Wishing you a great month ahead and, as always, thank you for your support.

## GET IN TOUCH

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# Laboratory

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# Turning tides

**A**t the time of writing this, the government has announced sweeping changes to NHS dentistry. These include a new health service model where dental therapists will take on more check-ups and treatments, a compulsory NHS tie-in for newly qualified dentists, and proposed reforms to the NHS dental contract. Following years of access issues and an exodus of dentists from the NHS, this renewed government focus is long overdue. However, it remains to be seen how quickly these changes will be implemented, whether they can reverse the damage already done, and if the new contract will be fit for purpose.

But the breaking news doesn't stop there. Shortly after these changes were announced, the government revealed that dental nurses, hygienists and technicians will no longer qualify for skilled worker visas following immigration law changes. This means that, from 22 July, no new overseas dental technicians will be able to work in the UK via this route. At a time when the number of dental technicians in the UK is in steady decline, this is alarming news. You can read more on both of these stories on page eight. What are your thoughts on these changes? I'd love to hear from you – email me at [lucy.veal@fmc.co.uk](mailto:lucy.veal@fmc.co.uk).

In more positive news, I am thrilled to announce that this year's Private Dentistry Awards will feature two dedicated categories for the dental lab community: Dental Technician of the Year and Clinical Dental Technician (CDT) of the Year. These new categories celebrate the vital work of technicians and CDTs in creating outstanding restorations. If you missed the chance to enter this year's Dentistry Awards, now is your moment to shine! With entry open, head to [dentistry.co.uk/awards/private-dentistry-awards](http://dentistry.co.uk/awards/private-dentistry-awards) for more information and to access the entry guide. Simply submit your entry by Friday 12 September for the chance to be considered! Good luck!

If you're undecided about entering, you may find some inspiration on page 22, where Deepa Bharakhda, winner of Dental Technician of the Year at this year's Dentistry Awards, details what winning meant to her and why she decided to enter the awards.

And finally, by the time you read this, the upcoming CPD deadline will be just around the corner. Make sure you avoid a last-minute rush and fulfil your requirements ahead of 31 July. One of the easiest ways to take the stress out of the deadline period is through Dentistry CPD. The website covers all your CPD needs and offers users instant access to more than 400 hours of enhanced CPD courses – find out more by scanning the QR code below.

If you have any feedback on this issue or would like to contribute to the next one, I would love to hear from you.

*h. Veal*

**LUCY VEAL**  
Editor of *Laboratory*



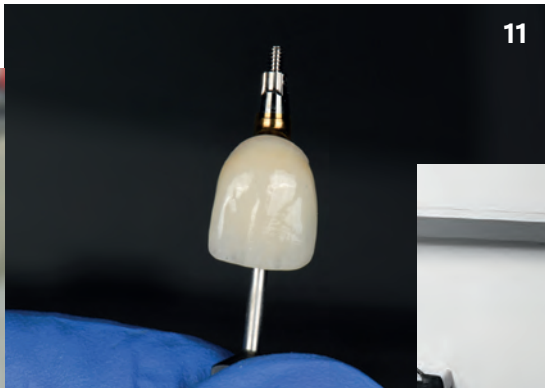
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Complete this issue's enhanced CPD online at [cpd.dentistry.co.uk](http://cpd.dentistry.co.uk) or scan the QR code. Email [cpdsupport@fmc.co.uk](mailto:cpdsupport@fmc.co.uk) if you're in need of guidance.

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# Laboratory's Lab Experts panel

Presenting **Laboratory's** editorial board – the Lab Experts helping to nurture connection, passion and quality within dental technology



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Clinical dental technician and managing director, CMB Dental Laboratory



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**BRIANA SLACK**

Dental technician, S4S Dental Laboratory



**LOLA WELCH**

Senior dental technician, Quoris 3D

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# Skilled worker visas axed

**S**weeping changes to UK immigration rules will bar new overseas dental technicians from working in the UK via the skilled worker visa route.

As a result, no new dental technicians can access the skilled worker visa route after 22 July 2025, according to the updated Appendix Skilled Occupations of the Statement of Changes in Immigrations Rules.

Only those already granted skilled worker status before 22 July 2025 and who have continuous permission under the same code will be eligible.

This comes after the General Dental Council (GDC) revealed that the number of registered dental technicians has fallen to its lowest recorded level in 2024, with just 168 new technicians joining the register.

## SKILLS THRESHOLD NOT MET

The same will also apply to overseas dental hygienists, dental nurses, and

other roles currently eligible under the health and care visa.

The roles have been removed due to not meeting the skills threshold, and are not on either on the immigration salary list (ISL) or temporary shortage list (TSL).

The changes to immigration rules were laid out in parliament and published on 1 July 2025. The document covers wide ranging changes to other visas, including skills and salary threshold increases, the end of overseas recruitment for care workers and more than 100 occupations no longer having access to the immigration system.

Dentists are not affected by the changes. *Dentistry* has contacted the Home Office to check if the changes impact dental therapists.

## 'RESET OF IMMIGRATION SYSTEM'

NHS Employers, the employers' organisation for the NHS in England, wrote that the changes mark a 'fundamental shift

in the UK's approach to immigration'.

Home secretary Yvette Cooper said: 'We are delivering a complete reset of our immigration system to restore proper control and order, after the previous government allowed net migration to quadruple in four years.'

'These new rules mean stronger controls to bring migration down, to restore order to the immigration system and to ensure we focus on investing in skills and training here in the UK.'

'As part of the Plan for Change, we can build an immigration system that serves the needs of the British economy and people – one that values skills, tackles exploitation and ensures those who come to the UK make a genuine contribution.'

# Government launches major NHS reforms

**T**he government has unveiled its 10-Year Health Plan, detailing major reforms of the NHS.

The 10-Year Health Plan lays out the government's plans for the future of healthcare in the UK. The Department of Health and Social Care (DHSC) said it 'delivers one of the most seismic shifts in care in the history of the health service'.

Prime minister Kier Starmer said: 'The NHS should be there for everyone, whenever they need it. But we inherited a health system in crisis, addicted to a sticking plaster approach, and unable to face up to the challenges we face now, let alone in the future.'

'That ends now. Because it's reform or die. Our 10-Year Health Plan will fundamentally rewire and future-proof our NHS so that it puts care on people's doorsteps, harnesses game-changing tech and prevents illness in the first place.'

Among the changes detailed in the plan are several measures to 'tackle the current

lottery of access to dentists'. The report says: 'By 2035, the NHS dental system will be transformed so it provides high quality care at the right time, and nobody goes without because they cannot afford it. We will build a service which is attractive to and values dental care professionals.'

## WHICH CHANGES AFFECT DENTISTRY?

- **Compulsory NHS tie-in for dental graduates:** newly qualified dentists will be required to practise in the NHS for a minimum period. Though not officially confirmed, the period is currently intended to be at least three years. The report says this change is because training a dentist costs the taxpayer up to £200,000
- **Neighbourhood Health Service:** the government plans to launch a Neighbourhood Health Service, bringing multiple healthcare services including dentistry under one local team. Within

this model, dental therapists will undertake check-ups, treatments and referrals to dentists for anything beyond their scope. Dental nurses will provide oral health advice and work with local schools and community groups

- **Contract reform:** the government said it would initially work with dentists to improve the dental contract in the short term. From the 2026-27 financial year, the contract will 'better reflect the cost of treating patients with higher needs' and reduce the amount of low-value activity performed by dentists.

Other changes include expanding the scope of practice for dental nurses, a greater use of fissure sealants to protect children's teeth, upskilling the dental workforce, and the expansion of water fluoridation schemes.

Scan the QR code for the full story on [Dentistry.co.uk](https://Dentistry.co.uk)



## GDC outlines its three-year plan

**T**he General Dental Council (GDC) has published its 2025-2027 *Costed Corporate Plan* (CCP), detailing its workplan for the next three years. Released in April, the CCP outlines what the regulator plans to do over the next three years and forecasts its income and expenditure for 2025.

The CCP sets out 29 projects for 2025-2027, 24 of which are on the 2025 workplan – 19 of these are 'flow through' projects from previous years, while five are new projects for this year.

The projects for 2025-2027 include:

- Revise the standards for education
- Revised international registration processes
- Addressing sexual misconduct in the context of professionalism
- Fitness to practise decision making guidance
- Improving communications and support in fitness to practise
- Case management and operational improvements in dental hearings.

The GDC's total forecast expenditure for the next three years is £141.4 million, a 0.9% increase of the agreed budget of £140.2 million. According to the regulator, this increase is due to changes in national insurance's threshold and rates, which were announced after the CCP was agreed in October 2024.

### 2024 IN REVIEW

The CCP also reviews the 2024 plan and highlights progress made, such as changes to overseas registration exam (ORE) access.

Out of 32 projects on the GDC's workplan for 2024, six were completed. Nineteen projects remain in progress and on track for delivery in 2025 or 2026, while six of them were removed from the plan. The CCP also highlights that the regulator processed a record number of applications in 2024 with 12,978 – an increase from 11,476 in 2023. This included 2,167 new dentists and 9,728 new DCPs being registered.

According to the 2025-2027 CCP, the GDC is looking to improve its registration processes by modernising it and making it faster. It has identified potential improvements and operation changes, such as moving to a digital, online application process, and it hopes to progress this work in 2025.

### GDC WILL LOOK TO 'REDUCE FEAR'

Tom Whiting, GDC chief executive and registrar, said: 'In our plans for 2025, you will see updated guidance on the standards for education and scope of practice, which are both possible as a result of extensive and invaluable stakeholder engagement.

'We will continue to improve fitness to practise by improving our signposting to help, improving our guidance on decision-making to ensure fairness and consistency, and by looking to address and reduce fear of us. We also want to improve our digital capability and modernise our processes, to improve the experience for dental professionals accessing online services, such as registration and renewal.

'We have work underway this year to do this to build the experience of us in line with the needs of our users.'

## The Dentistry Awards winners

The prestigious 2025 Dentistry Awards took place on Friday 6 June at the Athena in Leicester. Celebrating excellence in dentistry, the Dentistry Awards recognise dental professionals for their achievements and advancements.

Nominees are chosen for their exceptional skills, patient care and community contributions. The event not only honours individual and team accomplishments, but it also inspires continued excellence in oral healthcare. Find out who won in the laboratory categories below – congratulations to all!

### DENTAL TECHNICIAN OF THE YEAR

- Deepa Bharakhda – winner
- Edward Day – highly commended.

### CLINICAL DENTAL TECHNICIAN OF THE YEAR

- Matthew Varley – winner
- Craig Mark Broughton – highly commended.

### LABORATORY OF THE YEAR

- S4S London Dental Laboratory – winner
- Remo Dental Laboratory – highly commended.

## Laboratory Leading 20

## Laboratory Leading 20 returns

*Laboratory Leading 20* is back for a third year – a list that celebrates skill, influence and dedication in the UK dental laboratory sector. It recognises the extraordinary individuals who are driving the future of dental labs and setting new standards, shining a spotlight on the work being done in dental technology and its impact on the profession at large.

### HAVE YOUR SAY

Following the same format as the past two years, the *Laboratory Leading 20* will be selected by the FMC team in consultation with senior figures in the industry as well as you, the UK dental technology community. We want to hear who inspires you in dental technology, and who you think deserves to be recognised.

We invite you to participate by emailing [newsdesk@fmc.co.uk](mailto:newsdesk@fmc.co.uk) with your nominations – don't forget to tell us why you believe they deserve to be selected. We will then compile the 2025 list over the coming months, based on the nominations received and feedback from industry figures.

Your input is crucial in helping us shape this list, so make sure you have your say! The results will be unveiled in the Autumn 2025 issue of *Laboratory*.

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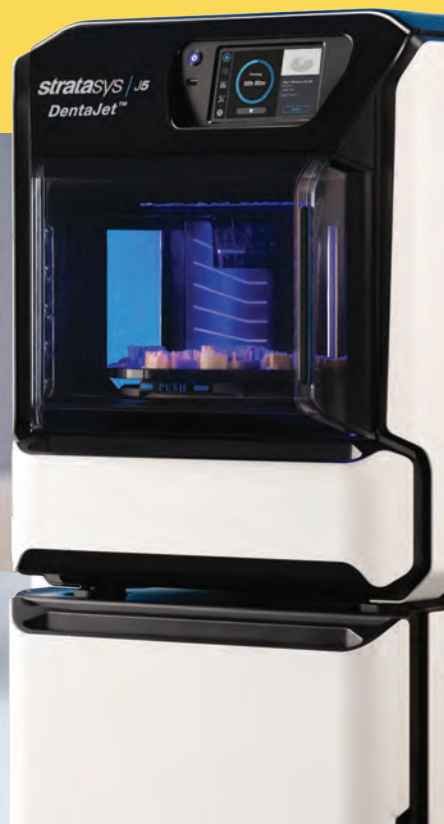
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**AJ Posca**

Posca Brothers Dental Lab



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**Dr. Douglas Benting**

Renew Dental



# A multidisciplinary approach

Emma Allsopp and Graeme Ker demonstrate an implant-supported rehabilitation of a compromised maxillary anterior region



**EMMA ALLSOPP**

Dental technician, Nexus Dental Laboratory



**GRAEME KER**

Dentist with a special interest in dental implants

A young female patient presented to our clinic with a complaint of a missing upper left central incisor. This missing tooth significantly impacted her smile aesthetics, causing her self-consciousness and affecting her overall quality of life. She expressed a strong desire to restore her smile to its natural appearance and regain full oral function.

Upon comprehensive clinical and radiographic examination, a recurrent significant infection associated with the adjacent upper right central incisor was detected – it already had multiple root canal fillings, reducing its ability to be restored. This presented an additional challenge to the treatment plan, as the infection needed to be addressed before any definitive restorative procedures could be initiated.

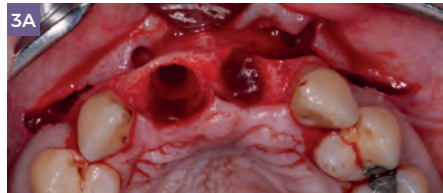
After a thorough discussion of all available treatment options, including the risks and benefits of each approach, the patient elected to proceed with the extraction of the infected tooth followed by implant placement. This decision was made with the understanding that it would provide a predictable, long-term solution for restoring



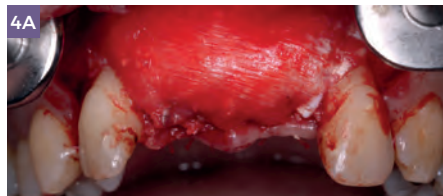
**FIGURE 1:** Preoperative view showing the missing upper left central incisor, highlighting the aesthetic and functional challenge at presentation



**FIGURE 2:** Incisal view of the maxillary arch, highlighting the edentulous space of the missing upper left central incisor



**FIGURES 3A and 3B:** Bone defect

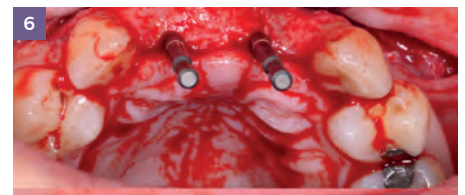


**FIGURE 4A:** Intraoperative view demonstrating bone augmentation of both sites

**FIGURE 4B:** Following bone augmentation, the surgical site is closed with sutures, ensuring primary closure and promoting optimal soft tissue healing



**FIGURE 5:** Complete healing of the extraction site. The healthy colour and texture of the gingival tissue indicates successful resolution of the initial infection



**FIGURE 6:** Intraoperative view showcasing the two 3.8x11mm Conelog progressive implants placed in their final positions within the augmented bone

both function and aesthetics in the compromised maxillary anterior region.

## CHALLENGES

This case presented a set of challenges that demanded careful planning and execution. The presence of an active infection in the upper right central incisor required meticulous management to ensure complete eradication and prevent any complications during subsequent implant placement. The upper left central incisor had been extracted three months prior and had left a significant bone defect that also required grafting. This is why it



**FIGURE 7:** Frontal view of the temporary crowns, demonstrating the interim restoration's function in shaping the emergence profile and establishing optimal soft tissue contours



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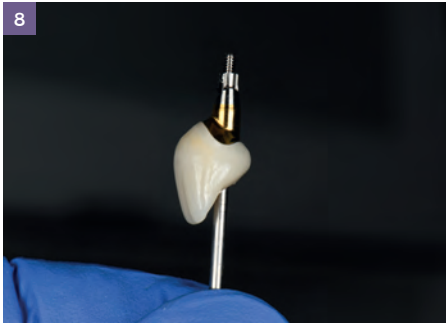
**GDC anticipated outcome:** C

**CPD hours:** One

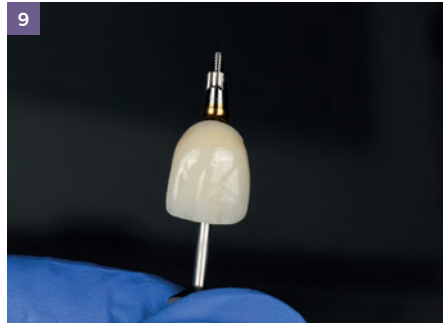
**Topic:** Implant dentistry

**Educational aims and objectives:** To present a multidisciplinary approach to an implant-supported rehabilitation.

This article qualifies for one hour of enhanced CPD. Turn to page 50 to answer the questions.



**FIGURE 8:** Proximal view of the final zirconia crown restoration



**FIGURE 9:** Buccal view of the final zirconia crown restoration



**FIGURE 10:** 3D printed model showcasing the final implant-supported restorations in situ



**FIGURES 11A to 11F:** A series of images showcasing the final results of the implant-supported restorations

was decided that guided bone regeneration was to be carried out across both sites, rather than just a simple ridge preservation.

Achieving optimal soft tissue contours around the implants was crucial for both aesthetics and function, requiring careful consideration of the emergence profile, papillae development, and soft tissue thickness. Precise implant placement with optimal angulation and parallelism was essential for successful prosthetic rehabilitation and long-term implant stability, demanding the use of advanced imaging and surgical guide technology. Throughout the multi-stage treatment process, maintaining patient comfort and managing anxiety

remained a priority, requiring clear communication, effective pain management strategies, and a compassionate approach to patient care.

### TREATMENT STAGES

The treatment plan was carefully staged to address each challenge systematically.

#### 1. Extraction and bone augmentation

The infected upper right central incisor was atraumatically extracted, and the socket was meticulously debrided to remove any infected tissue or debris. The bone material was a blend of cortical and cancellous mineralised human allograft.

The membrane was non-crosslinked, acellular type I porcine collagen tacked apically using titanium pins and secured palatally using non-resorbing 6-0 polypropylene sutures to promote bone regeneration on both sites and provide a stable foundation for future implant placement.

The site was then carefully sutured to ensure primary closure and promote optimal healing.

#### 2. Implant placement

After a six-month healing period, allowing for adequate bone maturation, two 3.8 x 11mm Conelog progressive implants were placed.

A surgical pilot drill guide, as well as a suck-down prosthetic stent, fabricated based on 3D imaging and planning, was used to improve precision of implant placement with optimal angulation and parallelism. This approach facilitated the subsequent prosthetic rehabilitation and ensured long-term implant success.

#### 3. Soft tissue management

To enhance the aesthetic outcome and create a natural-looking emergence profile, a connective tissue graft was harvested from the palate and placed buccally around the implants. This helped to increase the soft tissue thickness before the contouring process.

#### 4. Provisionalisation

Following osseointegration of the implants, splinted chairside provisional restorations were fabricated using non-index temp cylinders and Memosil impressions of the prosthetic wax-up. These provisional restorations served multiple purposes, including developing the contour of the soft tissues, shaping the emergence profile, and providing the patient with fixed aesthetics and function prior to the final restorations. The emergence profile was meticulously refined



every three weeks by adjusting the provisional restorations to achieve optimal scalloped margins and interdental papillae, creating a natural and harmonious transition between the restoration and the surrounding soft tissues.

## 5. Final restoration

After a period of contouring and tissue maturation, final restorations were fabricated by a skilled dental laboratory. Digital impressions were taken using an intraoral scanner (Itero), capturing the position of the implant, the precise contours of the surrounding soft tissues, and the fitting surface of the provisional restorations. Along

with clinical photos, this comprehensive digital data allowed for the fabrication of highly accurate and aesthetic restorations that seamlessly integrated with the patient's existing dentition.

## FINAL PRODUCT

The final restorations were a resounding success, exceeding the patient's expectations. The implant-supported crowns blended seamlessly with her natural dentition, restoring her smile to its former beauty and function.

The patient expressed immense satisfaction with the improved aesthetics, noting a significant boost in her self-confidence. She was also delighted with the restored oral function, allowing her to eat and speak with comfort and confidence.

## REFLECTIONS

This case exemplifies the power of a multidisciplinary approach in addressing complex dental challenges. The successful

outcome was a result of meticulous planning, precise execution, and seamless collaboration between the clinician, the dental technician, and the patient.

The integration of digital technology, including 3D imaging, surgical guides and intraoral scanning, played a pivotal role in enhancing accuracy, predictability and efficiency throughout the treatment process.

Furthermore, this case highlights the importance of effective communication and patient education. By clearly explaining the treatment plan, addressing the patient's concerns, and managing expectations, we were able to build a strong rapport and ensure her active participation in the treatment process.

This case has reinforced the value of continuous learning and refinement of techniques. By critically evaluating each step of the treatment process and reflecting on the outcomes, we can identify areas for improvement and further enhance our clinical skills to provide optimal patient care. [L](#)

THIS CASE PRESENTED  
A SET OF CHALLENGES  
THAT DEMANDED  
CAREFUL PLANNING AND  
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# Meeting complex needs

**Leah Potter** shares an anterior restoration case in which communication, precise shade matching and complex characterisation were all key to keeping the patient satisfied



## LEAH POTTER

Apprentice dental technician,  
Go Digital Dental

### CASE OVERVIEW

Anterior restorations can be challenging to get right at the best of times, but what happens when two completely different appliances are required, in two different materials and different shades? This combination is exactly what was needed for this case.

The patient presented with a partial denture in replacement of a lateral that had been extracted ready for a Maryland bridge and a central tooth that required a new crown. The clinician sent the patient to the lab for personalised shade matching. When taking the first look at the natural dentition, I was immediately excited to take on this case, due to the range of colours and textures existing in the mouth.

The patient wore a bright temporary crown on the central and mentioned he was interested in whitening in the future as he liked the shade of the temporary a lot. The temporary crown was matched to an A2, whereas the lateral needed to blend into the canine, so a shade A3 with a B4 neck was chosen (Figures 1

to 3). With the possibility of whitening in the future and the patient loving the shade of the temporary crown, there was an element of the unknown...

Staining, varying translucency and crack lines were all present features on the existing teeth, which the patient wanted to incorporate, but not too much in case he did decide to proceed with whitening.

I was so honoured to be able to take this shade myself as personalisation was key here, and I couldn't wait to get started.

### TECHNICAL WORK

The materials were already chosen by the clinician: Luxor Z True Nature zirconia with an opaqued fit surface and a porcelain fused to metal bridge using the Noritake EX-3 range. I wasn't too concerned with the difference in materials due to the beautifully high aesthetics that the zirconia alone holds now.

Regarding the design, the patient wanted the most natural outcome, so the crown was designed almost identically to the adjacent. The metal work was designed with a wing on the canine with the pontic placed further back to ensure plenty of space to add all the characteristics in porcelain. The crown was designed with all the texture included so the chance of getting a highly natural-looking crown was achievable before I even got my hands on it. The diastema had to stay, but luckily the patient was keen on keeping it anyway.

I fitted the zirconia to the model and left it until the bridge was layered (Figure 4) as I wanted to make sure the staining matched correctly. After degassing and opaquing the metal work in a shade A2, I began layering the ceramics. I started with the basics – a thin layer of opacous body and the bulk of it in an A3 dentine. I decided that many of the characteristics should be added in porcelain rather than staining because the natural



**FIGURES 1 to 3:** I was initially drawn towards shade A3 for the central because the patient's natural teeth had bright undertones with some staining around the neck and an abundance of character. However, the possibility of future whitening had to be kept in mind. Naturally, the canine was darker than the central, so I thought choosing two different shades would create a nice transition

THIS CASE REMINDED  
ME OF THE IMPORTANCE  
OF COMMUNICATING  
WITH THE PATIENT  
THOROUGHLY BEFORE  
STARTING THE CASE



CLAIM  
YOUR  
CPD

**GDC anticipated outcome:** C

**CPD hours:** One

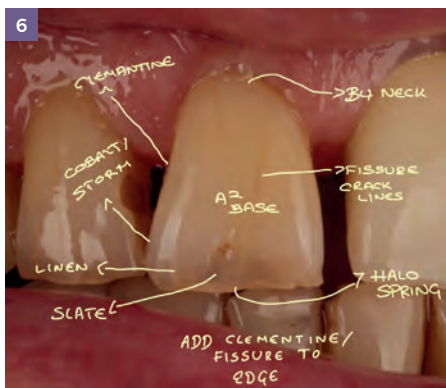
**Topic:** Anterior restorations

**Educational aims and objectives:** To present an anterior restoration case.

This article qualifies for one hour of enhanced CPD. Turn to page 50 to answer the questions.



**FIGURES 4 and 5:** I decided to fit the zirconia but did not stain it until the ceramic was built so that I could make sure I got all of the detail right. I used porcelain stains to clearly define where each different layer was placed



**FIGURE 6:** I used a range of photographs from different angles to characterise the teeth, but I used this one specifically to create the colour map, as I found it best captured all detail



**FIGURE 7:** The natural translucencies seemed heavy with the open jaw, however the patient had an overbite so I refrained from adding too much greyiness to the incisal edge so that it wouldn't look over done when the patient smiled, without light passing through the teeth

teeth had deep crack lines and strong translucencies.

I cut the dentine layer back to add white porcelain in the form of very thin crack lines and placed more dentine on top so the cracks would look deep and natural. I started adding a thin layer of enamel and added blue and grey porcelain delicately to the incisal edges, before finishing the final shape with the enamel (Figure 5). Before baking, I also chose to add a thin halo on the very edge with creamy enamel.

The porcelain bridge was almost where I needed it to be after the first firing in the furnace, aside from a few areas on the incisal edge that needed more length after shrinking back slightly. I usually add a layer of lustre on the second firing, but I didn't on this case because I was waiting to see how the teeth would look with just staining on top of the effects I had already added.

I cooled the bridge for a long time and prepared it for staining by using a few different diamond burs to add texture and shape. I mainly used my tapered diamond to add some light definition from the incisal

edge upwards and roughness up to the neck, followed with my light silicone rubber to smooth slightly.

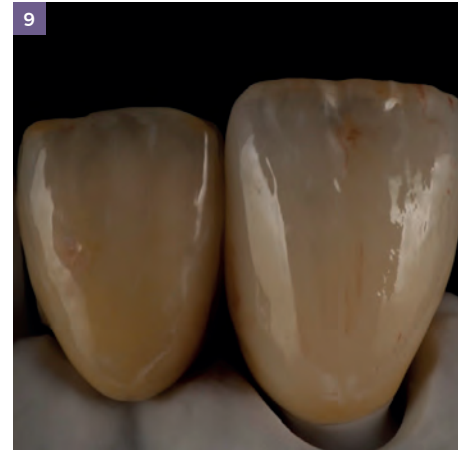
## ADDING CHARACTER

Regarding characterisation, I used the Miyo system following a colour map I'd made for myself using the patient's photos on an iPad. I'm usually opposed to using the iPad and like to draw my colour maps by hand with pencils but doing it this way gave me the ability to zoom in on the photos and really see the intricate detail within them (Figure 6). I used many different colours in this case, from oranges and browns on the necks down to yellows, blues, whites, greys and even black on the incisal. The hardest part about staining these teeth was knowing that the patient required the teeth to be slightly lighter than the natural dentition and trying to find that balance.

I DECIDED THAT MANY OF THE CHARACTERISTICS SHOULD BE ADDED IN PORCELAIN RATHER THAN STAINING BECAUSE THE NATURAL TEETH HAD DEEP CRACK LINES AND STRONG TRANSLUCENCIES

The patient also communicated that he did not want too much of the brown staining, which of course goes against the natural artistic flow of trying to match a single central perfectly. I added all of my colour on the first stain firing and then a very thin layer of glaze on a glaze firing to ensure the teeth didn't appear too glossy and kept all of the added texture.





**FIGURES 8 to 10:** The final restorations on the working model and in situ with natural bite and relaxed lips

The patient came back for a final shade check, which I was nervous about to say the least due to the challenges faced during this case and my strive for perfection. To my delight, the patient was very pleased and, although I wanted to add more warmth to the central crown, the patient felt confident it looked correct as it was (Figure 7).

### FINAL PRODUCT

Although there were challenges in this case, the final outcome matched exactly what the patient had requested, and he was very happy with it at the final shade check and fit appointment. The clinician also expressed how satisfied he was with the final fit and the patient's natural appearance, which was a big concern for the patient from the start (Figures 8 to 10).

### REFLECTIONS AND ACKNOWLEDGMENTS

This was a great case to put my technical, layering and staining skills to use and, although I was nervous about the final outcome, I was relieved when both the patient and clinician were happy. This case reminded me of the importance of communicating with the patient thoroughly before starting the case, and how crucial shade-taking appointments can be.

As an apprentice, it can be difficult to find confidence within these complex cases, and there are many times when doubt over your own skills and knowledge can creep in. This case has encouraged me to continue researching different techniques and ways of working when it comes to porcelains, as well as practising and expanding my skill set

THE HARDEST PART ABOUT STAINING THESE TEETH WAS KNOWING THAT THE PATIENT REQUIRED THE TEETH TO BE SLIGHTLY LIGHTER THAN THE NATURAL DENTITION AND TRYING TO FIND THAT BALANCE

surrounding shade selections and photography. Now, in future cases, I will have more confidence to produce detailed anterior restorations and explore new techniques.

Of course, this shows that students absolutely have the ability to produce complex aesthetic cases when given the chance and support within the lab by other technicians. This case would not have been possible without the patient's effort and the patience shown during each appointment, as well as the wonderful clinical work by Dr Steve Pearce at Sawley Dental in Nottingham.

I could not have completed this case without my wonderful team leader and head ceramist at the lab, Jenna Ellis. Without her expert knowledge and eagerness to support me during this case, I would have been a little lost. I also owe much credit to the fabulous technicians and managers that I work with every single day who pride themselves in giving apprentices the same opportunities as qualified technicians and understand the importance of doing so for the future of dentistry. [L](#)

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# I met my younger self for coffee...

Lola Welch imagines what she would say to comfort her 20-year-old self over coffee



**LOLA WELCH**

Senior dental technician,  
Quoris 3D

**S**he was 20 years old. I gave her a hug and tried hard not to cry. She looked so strong and healthy, but I knew that on the inside, she was tired, fragile – and starving.

She spent every minute of her day worrying about everything – especially the number on the scale. Controlling her weight gave her a sense of power over the chaos in her life.

I told her to stop worrying so much, to let go, because there was so much life to enjoy while she was young – and even more ahead! I wished she knew that what she

I TOLD HER TO STOP WORRYING SO MUCH, TO LET GO, BECAUSE THERE WAS SO MUCH LIFE TO ENJOY WHILE SHE WAS YOUNG – AND EVEN MORE AHEAD

was worried about now wasn't important. What was important were her skills, determination and hard work – because those would allow her to have a good life and a fulfilling career.

## LIFE-CHANGING DECISIONS

I thanked her for choosing dental technology as her path. She didn't know yet that it was possibly the most important and best decision she would ever make. I also told her that her two best friends would still be in her life years later!

But she didn't want to listen. She felt angry and defeated. She didn't believe me when I told her that one day, she'd move to London for the summer – and stay. And that choice would change her life.

She was surprised. Her English was far from fluent. She struggled – her dyslexia made her feel useless, like she'd never achieve anything.

I told her that was far from true. I told her she'd find a great job, meet her husband, have a beautiful daughter, make bold decisions – and that it would all pay off. She'd teach, travel, write articles, and meet so many wonderful people.

But she couldn't believe any of it. And instead of excitement, I saw even more sadness in her eyes.

We sat in silence for a few minutes. I think she was processing it all. She slowly picked up the croissant in front of her, paused for a second, took a big bite – and smiled at me.

Maybe... maybe she believed that everything I told her was possible. [L](#)



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# A small fish in a big pond

Amanda McMillan opens up about the challenges of running a small lab in a fast-paced, digitalising profession



**AMANDA MCMILLAN**

Owner, McMillan Dental Laboratory

I recently asked other small lab owners like me if they felt like there was room in this big wide world for us now that everything is going digital. I went into the conversation feeling a little worried that I couldn't compete with the bigger labs out there as they seem to be far ahead from where I am right now. But by the end of it, I was more confident than ever in myself, what we do and where we are going.

## THERE IS ONLY ONE OF ME

Now, this is not me saying anything negative about bigger labs – I admire them massively. The hard work that we small lab owners all put in daily is magnified for bigger labs, and the number of worries we have are 30 times as big for them. What I was personally worrying about was whether we can learn all this new technology and afford all the equipment etc.

The bigger labs around me seem to already be doing so much more than us and, honestly, it worried me.

One of the biggest struggles I have found as a small lab owner is that there is only one of me. I am responsible for the GDPR, Dental Appliance Manufacturers Audit Scheme (DAMAS) audits, payroll, invoicing clients, ensuring payments are being made, sorting any problems with clients, and making sure nothing goes wrong in the lab.

When I say I love the lab, I really mean it. I am so dedicated to my dentists and my staff. I love what we do, and I never let anyone down. If I promise something, I make sure it's done.

## PERSONAL STRUGGLES

When I was expecting my first child, I was nervous about not being in the lab full time. I was thinking: what if someone does something wrong and I don't see it? What if the person doing my job doesn't do it as well?

The plan was for me to take on someone to do my day-to-day tasks while liaising with me throughout the day so we could keep the lab working perfectly.

My mum offered to play a big role helping, and this gave me a lot of comfort. What could go wrong with that set up, right?

Six months into my pregnancy, I woke up to find my mum had passed away. In that moment I had a million thoughts going through my head: what do I do now? How do I carry on? Panic set in instantly. That morning, I had to go back to the lab and carry on.

I would say I am a strong person – my mum taught me that you need to keep going. But unfortunately, as a small lab owner, it's a case of carrying on or closing. No one could do my job, so what choice did I have? The one blessing for me at this hard time was it was near Christmas, meaning I had two weeks off to get my head together a little and interview people to start training them before my little one came.

## THERE IS A PLACE FOR SMALL LABS

Back to asking other small lab owners about how they feel in the current lab world, I had some great responses that made me see that, yes, there is place for us, and we might not have 20-30 plus staff or have millions to spend on machinery, but I am very happy to say we have just invested in some amazing digital machinery/software. I do think we can offer just as much as the bigger labs, but just not in the same volume – and that's OK.

Here are some of the responses I received:

- 'I have the mobile numbers of many of my dentists and we all Whatsapp daily talking about work. I love the personal service I can offer being a small lab'
- 'We are small and very personal. I love that I don't have a lot to manage, otherwise I don't think I could give such a good service'
- 'I would say there is value in both big labs and small labs. Some dentists need the volume and the speed a big lab can offer, but some dentists don't need that'.

If you are ever in doubt about being a small lab and worried about going into the digital side of things, please know it can be done. **L**



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# And the winner is...

After winning Dental Technician of the Year at this year's Dentistry Awards, we get to know **Deepa Bharakhda** and hear her top tips for other technicians



**DEEPA BHARAKHDA**  
Dental technician, J Vara  
Dental Laboratory

## PLEASE INTRODUCE YOURSELF

My name is Deepa and I am a dental technician based in Leicester, currently working at J Vara Dental Laboratory. I have a special interest in prosthetics and implant prosthetics, with a growing passion for crown and bridge work.

I consider myself very fortunate to be in a workplace that encourages continuous learning, allowing me to develop my skills in both traditional prosthetics and digital dentistry, ultimately aiming to become a versatile and well-rounded dental technician.

What drives me most is the art of creating natural, lifelike smiles and the satisfaction of helping restore patient's confidence. I also believe in the importance of strong, collaborative relationships with dentists, ensuring every case is handled with care and precision.

Beyond the lab, I am proud to be the co-founder of Nightshift, a platform supporting dental technicians through education and community. I also serve as the social media coordinator for the dental charity Den-Tech, helping raise awareness for access to dental care for those in need, and I am a key opinion leader (KOL) for Bredent UK, contributing to product development and education initiatives within the profession.

## HOW AND WHY DID YOU BECOME A DENTAL TECHNICIAN?

Like many people growing up, I went through several phases of deciding what I wanted to be – from a teacher to a lawyer, and even a barrister at one point. It wasn't until secondary school that I started seriously

considering a career in dentistry.

I was eager to learn more about the field and took the initiative to arrange work experience placements at dental surgeries, immersing myself in the clinical environment.

When it came to my A-levels, I narrowly missed the grades required for dentistry. It felt like a setback at the time, but it turned out to be one of the best detours I could have taken. I decided to pursue a degree in dental technology at Manchester Metropolitan University, with the intention of applying for dentistry afterwards – that was the plan.

However, during my final year, everything changed. As part of our clinical sessions with second-year dental students, we worked together treating patients – with the dental students carrying out clinical assessments and myself fabricating dentures for the cases. That experience was a turning point. I realised just how much impact a dental technician could have on someone's smile, confidence and overall wellbeing.

## IF YOU WERE NOT IN DENTISTRY, WHAT WOULD YOU BE DOING?

If I wasn't a dental technician, I think I would have ended up in a completely different profession – either a teacher, a lawyer, or even a barrister!

Quite the opposite to dentistry, I know, but growing up I was always drawn to roles that involved problem-solving, communication, and making a difference in people's lives in some way. It's funny how life leads you to where you're meant to be, even if the path looks very different from what you first imagined.



SOMETIMES, IT TAKES THE  
PEOPLE AROUND YOU TO  
REMIND YOU OF YOUR  
WORTH

## WHAT PUSHED YOU TO ENTER THE DENTISTRY AWARDS?

To be completely honest, the imposter syndrome in me would have never allowed myself to enter on my own. It was actually my best friend, Nina, who gave me the push I needed. She's my biggest cheerleader and has always seen the passion and dedication I have for this profession, even at times when I doubted myself.

It was her encouragement and belief in me that made me take that step, and I'm so grateful she did. Sometimes, it takes the people around you to remind you of your worth and to help you see what you're truly capable of.

## HOW DID IT FEEL TO WIN?

When my name was called, I was honestly shaking in disbelief – I couldn't believe it for a second. It was one of those surreal moments when you almost have to pinch yourself to

WHEN MY NAME WAS  
CALLED, I WAS HONESTLY  
SHAKING IN DISBELIEF



# Laboratory

make sure it's real. I felt so happy and overwhelmed with gratitude. It's a feeling that's hard to put into words, knowing that your work, passion and efforts to share knowledge, support fellow technicians, and give back to the dental community have been recognised.

To have my name out there and be celebrated among so many talented people in our profession truly means the world to me.

## DO YOU HAVE A STANDOUT CAREER MOMENT?

One of the biggest standout moments in my career was when the team from Bredent UK and my rep, Dave Hanley, asked me to do a hands-on demonstration at one of the world's largest global dental trade fairs. It was such a proud and surreal moment to be given the opportunity to showcase my skills and share my knowledge on an international platform.

To then be asked to become a KOL for Bredent was genuinely a dream come true. It was a huge personal and professional achievement, and a reminder of how far you can come when you stay passionate and open to new opportunities.

## THE BIGGEST THING STANDING IN OUR WAY IS USUALLY OURSELVES

### WHAT'S YOUR TOP PIECE OF ADVICE FOR OTHER DENTAL TECHNICIANS?

Believe in yourself and just go for it! This profession is full of opportunities, but so often we hold ourselves back because of self-doubt or fear of not being good enough. I've been there, and I've learned that the biggest thing standing in our way is usually ourselves.

Whether it's applying for an award, putting your work out there, attending a new course, or stepping out of your comfort zone, trust in your ability and take that leap.


### WHAT MESSAGE WOULD YOU GIVE YOUR YOUNGER SELF STARTING OUT IN DENTAL TECHNOLOGY?

I would tell my younger self to spend more time on practical work, and to practise, practise and practise some more. Be patient with yourself; skills take time to develop, and it's OK not to get everything perfect straight away.

I'd also remind myself not to be shy about asking questions. No question is ever too small or silly, and every bit of curiosity helps you grow. The more you ask, the more you learn – and it's those moments of learning, even from mistakes, that shape you into a better technician. Trust the process and enjoy the journey.

### IS THERE ANYTHING ELSE YOU WOULD LIKE TO ADD?

I just want to remind anyone reading this, whether you're a student, newly qualified, or years into your career, that this profession is what you make of it. Dental technology is an incredible blend of science, art and care. It's a career where your hands and your creativity can truly change people's lives.

Most importantly, be kind to yourself along the way. Celebrate your wins, no matter how small, and believe that you belong in every room you walk into. This profession needs passionate, driven people and if you've chosen this path, you have something special to offer. 

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# My vision as president

Joanne Stevenson shares what she hopes to accomplish as the new DTA president, and how she aims to approach various challenges



**JOANNE STEVENSON**

President, Dental Technologists Association (DTA)

## PLEASE INTRODUCE YOURSELF

My name is Joanne Stevenson, and I am the newly elected president of the Dental Technologists Association (DTA). I am a prosthetic dental technician originally from Manchester, currently residing and working in Belfast.

My journey into dental technology began during my school years, guided by my careers officer. With a strong aptitude for sciences, I was keen on working in a laboratory setting. After interviews at microbiology labs at Christie Hospital and Scottish and Newcastle Brewery, I was eventually introduced to a dental laboratory. I was immediately captivated by the field, as it perfectly combined my passion for hands-on work with my interest in science.

I had the opportunity to connect with a group of dentists who were offering scholarships to aspiring dental students. They facilitated my placement in a prosthetics lab, and I subsequently enrolled at Manchester Metropolitan University to pursue a BTEC national in dental technology. Over the course of four years, I balanced my time between working in the lab four days a week and attending classes one day a week.

In 1995, I qualified as a dental technician and relocated to Belfast, where my family is from. Currently, I work in the prosthetics department at one of the largest laboratories in Northern Ireland. My role encompasses all aspects of prosthetics, including implant-retained overdentures and hybrid bridges.

## HOW DOES IT FEEL TO BE ELECTED DTA PRESIDENT?

I joined the DTA council during the COVID-19 lockdown period after submitting an article for *The Technologist*, which led to

an invitation to join the management team. After three years on the team, I was elected deputy president alongside Delroy Reeves, who was president at the time. Over the next two years, I gained invaluable insights and experience under Delroy's leadership. This year, I had the honour of being elected as the first female president of the DTA.

It is a tremendous privilege to be entrusted with this role by my fellow council members, and I am committed to leading the association with dedication and integrity.

## WHAT IS YOUR VISION FOR THE DTA DURING YOUR TIME AS PRESIDENT?

My vision for the DTA is to continue being a strong advocate for our members, providing them with advice and guidance throughout their careers. I aim to promote education and training, offering lifelong learning opportunities and advocating for the highest standards of practice.

The management team is always looking for ways to improve benefits for our members and provide them with as much information as possible, and we have an exciting year ahead.

With the support of the team, I hope to continue adding valuable resources for our members as the profession evolves.

## THE DECLINE IN DENTAL TECHNICIANS IS A MAJOR CONCERN. HOW DO YOU HOPE TO APPROACH THIS CHALLENGE?

The decline in dental technicians is indeed a significant concern. While there are still several colleges offering courses at various levels, the situation is particularly challenging in Northern Ireland, where training opportunities are more limited compared to the UK mainland. Many students are forced to resort to distance learning to pursue their education.

The DTA is committed to supporting students throughout their studies by providing copies of *The Technologist* and offering reduced-price student memberships.

Through this, we aim to highlight the importance of dental technology and attract new talent to the field by showcasing the rewarding career opportunities it offers.

## HOW DO YOU HOPE TO COMBAT ILLEGAL AND UNREGULATED MANUFACTURE?

In trying to maintain a level playing field, we are committed to educating our members and raising awareness of regulations to all professional bodies, ensuring compliance with the Medicines and Healthcare products Regulatory Agency (MHRA) and Medical Device Regulations (MDR) for custom-made dental devices.

The DTA continues to advocate for compliance with these regulations and highlights the essential role of dental laboratories in oral healthcare. We regularly meet with regulators to discuss these important topics.

## WHEN YOU LOOK BACK ON YOUR TIME AS PRESIDENT, WHAT KIND OF IMPACT DO YOU HOPE TO HAVE MADE?

I hope that when my tenure as president comes to an end, the association will remain as strong as it is now and, under my leadership, will have moved on to even greater achievements. I hope to have made a significant impact by advancing the standards of dental technology, supporting the professional growth of dental technicians, and ensuring the highest quality of care for patients.

My aim is to leave a legacy of innovation, collaboration and excellence within the DTA. [L](#)





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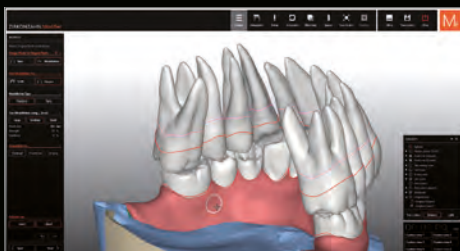
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# The future lab

What will a dental laboratory look like in 2030, asks **Ashley Byrne**



## ASHLEY BYRNE

Associate director, Byrnes  
Dental Laboratory

I want to strip things back and ask: what will a real dental lab look like in 2030?

Not the fantasy, but the future we're actually building, or certainly should be. I believe we have an incredible opportunity ahead of us, but if we don't rapidly change, someone or some company will take that opportunity away from us.

Let's start with the obvious: analogue isn't dead, but it's on life support. By 2030, the average lab won't be full of Bunsen burners and model trimmers. It'll be a hybrid space – part design studio, part production hub, part IT department.

Design will continue to shift away from physical artistry and into digital planning suites, with technicians spending more time with 3D mice and dual monitors than wax carvers and articulators. But that doesn't mean creativity disappears. In fact, the best labs will be the ones who combine artistic sensibility with digital agility.

It won't be about replacing the technician. It'll be about blending their skill set with technology that frees them from boring grunt work so they can focus on high-value tasks: aesthetic design and finish, complex problem-solving, and close collaboration with clinicians.

**IF WE DON'T RAPIDLY CHANGE, SOMEONE OR SOME COMPANY WILL TAKE THAT OPPORTUNITY AWAY FROM US**

## THE REMOTE REVOLUTION

Another reality? Labs won't just change in shape, they'll change in location. I'm already seeing this happen in my own lab: a Corus technician in France designs my guided surgery and I print at Corus Byrnes here in Oxford and ship for a practice in Cornwall, all in record time and a everyone playing to their strengths.

By 2030, we'll see a massive decentralisation of lab services. Remote design teams will become common, powered by global talent and platforms that manage case flow in real time.

Some labs could even go fully virtual – no physical facility, just designers, cloud-based software and manufacturing partners.

## THE AI ELEPHANT IN THE ROOM

Now, let's address the buzzword we can't avoid: AI.

By 2030, AI won't be a novelty, it'll be a backbone. Expect automated case sorting, real-time margin detection, even predictive design suggestions based on patient data and clinician history.

But here's the truth: AI won't make technicians obsolete. It'll make bad ones irrelevant and good ones invaluable. Because AI is only as good as the person guiding it. The best labs will use AI as a co-pilot, checking designs, flagging anomalies, speeding up workflows. It's not about losing the human touch, it's about amplifying it.



## CULTURE WILL MATTER MORE THAN EVER

If you're imagining all this tech with the same team and culture you have today, think again. The lab of 2030 won't just look different, it'll feel different.

We're going to need a new kind of technician – one who's as comfortable talking workflows with a dentist as they are experimenting with new materials. We'll need collaborators, communicators, creative thinkers.

And we'll need lab leaders who foster that environment – who see their role not just as a production manager, but as a mentor, coach and culture shaper.

Investing in people won't be optional, it'll be the only way to stay relevant.

**AI WON'T MAKE TECHNICIANS OBSOLETE. IT'LL MAKE BAD ONES IRRELEVANT AND GOOD ONES INVALUABLE**

## THE BOTTOM LINE

So, what will the lab of 2030 look like? It'll be more digital than ever, connected through cloud platforms and real-time workflows. Many won't have four walls in the traditional sense, design and production will happen across locations, sometimes even across borders.

Collaboration will sit at the heart of everything, with technicians embedded in clinical teams, not operating in isolation. AI will be a silent partner in the background, handling all of the repetitive tasks so we can focus on what really matters: the artistic design and problem-solving solutions. Not products.

But above all, the lab of the future will be run by forward-thinking people – those who understand that progress isn't about machines, it's about mindset. It won't be perfect, and it won't be easy, but it will be exciting – for those who are ready to evolve.

The future lab isn't a building. It's a way of thinking, and it starts now. [L](#)





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# Addressing material failure

Tony Atkins shares some common restoration types, depicting the benefits and limitations



## TONY ATKINS

Dental technician and department lead,  
Ceramic Designs Laboratory

**A**t Ceramic Designs Laboratory, we see a high volume of large rehabilitations, so I can confidently say we've restored a wide range of cases using all kinds of materials.

Naturally, we choose what's most appropriate for each situation.

Personally, I think it's unwise to claim that any single material is suitable for every scenario – because it simply isn't. I often feel concerned when I hear such claims. In my experience, they tend to come from a viewpoint that is economically simplistic – favouring materials that are easy to manufacture, inexpensive to fabricate, and justified as being cheap to replace or repair. These are often promoted as the pinnacle of modern solutions.

That's just my opinion, of course. But what I'd like to emphasise is this: every material has its place, and there is no one-size-fits-all answer.

### ACRYLIC HYBRIDS

In many cases where dental failure is long established, there will be a need to re-establish lost occlusal vertical dimension (OVD) and, with it, functional guidance, and here lies the problem.

Acrylic teeth are intrinsically soft, and this can vary depending on which teeth are chosen. Failure can be exacerbated with more premium brands due to their higher glass content. This, of course, allows for greater aesthetics, but can make them more brittle.

Add to the mix a soft titanium substructure and given a reorganised dentition, the teeth will begin to fail and, unless you factor in repairs and explain this to patients, disappointment will follow. Many early acrylic wraps are now, at a great



cost, having to be remade in alternative materials. This does not mean that acrylic hybrids should be simply put out to pasture, as in many cases they offer the most aesthetic outcomes, but they do have limitations. It is also important to add that the acrylic hybrid cannot be brought into a digital workflow.

### THIMBLE BRIDGES/WORLEY BRIDGES

This historic form of restoration possibly dates back as long as I have been in dentistry, first devised by a Dr Peter Worley and later given various names to describe the same thing.

They were originally constructed as part of a porcelain fused to metal restoration where large amounts of hard and soft tissue had been lost and angle correction was beyond the realms of anything an angled abutment could achieve. It is also

important to add that these restorations date back before transmucosal multi-unit abutments were commonplace. The idea behind them was to create a substructure that would consist of the desired number of preparations with individual crowns then cemented to the structure. This leaves those individual teeth with angle correction for the clinician to cement chairside. Furthermore, the pink will have been fabricated using ceramic and, in some cases, post cementation chairside pink flowable composite would be used to fill in the small spaces left in order to seat those elected crowns. It has never been possible to achieve a path of insertion without these gaps.

Fast forward to the current incarnation, where titanium bars and zirconia crowns are used followed by pink composite being applied to make up the soft tissue zone.



Over the last five years we have come to accept that these are now seldom constructed in our workflow. Some of the clinical and mechanical issues we have experienced are:

- Significant plaque retention around the joints despite manufacturer recommended protocols
- Irritation of the tissues caused by the composite and plaque retention (a rare outcome, but it does occur)
- Compromised aesthetics where implants are placed in less than favourable positions, for example splinting of units where implants have been placed in would-be embrasure spaces
- Failure of the pink composite caused by flexure of the titanium substructure.

### FULL ZIRCONIA

This restoration type is where we have focused a considerable amount of effort in developing most recently, from understanding especially in the soft tissue zone what works clinically, from ceramic lustre to anatomical form. We have a team made up of clinicians and technicians that have invested a huge amount of time in formulating a completely digital workflow.

The full zirconia restoration to date has proved to be our most predictable and reliable solution. The pre-sinter modification of the structure is a crucial and sensitive affair, taking a considerable amount of time in refining the definition between each tooth, being careful not to encroach on weak zones and, of course, introducing surface character. Some of this is required due to the minimum bur size of 1mm being used during the milling process.

Aside from the aesthetics, the key to its success is the fact it's one homogenous material with minimal junctions, only those around the cylinders, which generally being an FP3 are cleansable.

As with the other forms of restoration in this list, there are some drawbacks:

- Diagnostic and digital work ups are crucial, although I would strongly suggest that this is the case for all large rehabilitations. However, in the case of a full zirconia, it is a very difficult road to navigate if there are occlusal issues or any issues at all with the arrangement of set up
- They are hugely expensive to manufacture both in materials and labour
- We have, on occasion, received patient



feedback indicating that when both the upper and lower arches are restored using full zirconia, some of them experience a 'clanging' sensation. In very rare cases, this has led to replacing the lower arch with an acrylic wrap. This scenario is so rare that it doesn't negate what has been a hugely successful solution to date.

### METAL CERAMIC

It's fair to say that the metal-ceramic bridge is the most labour-intensive and technique-sensitive restoration available. Its successful fabrication heavily relies on specific skill sets within the laboratory team – skills that are becoming increasingly rare with each passing year.

Some consider this type of restoration to be the most patient-friendly, and in certain cases it remains the only viable solution for a fixed restoration, particularly when vertical space is limited, or the anterior-posterior spread is unfavourable. However, as noted above, there are several key points that need to be considered:

- There are significant limitations in skill

sets available when fabricating a metal ceramic solution to a particular standard

- It is not possible to fully construct within a digital workflow. In most cases these days the alloy substructure is digitally designed and then milled, although it is possible where required to have the substructure digitally designed and outsourced for fabrication
- Chipping and fracturing can happen, and given the array of alloys and ceramics available, should the patient not return to the original practice, there will be no way of knowing what exact materials have been used. It then makes it highly unlikely that any laboratory will undertake repairs due to firing temperatures and CTE. In the worst-case scenarios, you may have to strip back to substructure and re-veneer, resulting in a completely new bridge with the fees associated.

And there we have it! A list of common restoration types, depicting both the benefits and limitations.

As mentioned previously, this list is not exhaustive, and opinions are based only on my experience. [L](#)

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# Essential features of tooth layers

**Siba Alhosin** outlines the essential layers of natural teeth and how understanding them improves aesthetic restorations and material selection



**SIBA ALHOSIN**

Dental technician, Qlab

**T**he planet we live on is composed of numerous layers, extending from its core to the unseen magnetic field in outer space. It's incredible how the ice layers at the Earth's poles have accumulated over thousands of years, forming countless prominent layers from a single material.

Through layers, we get a great idea about the Earth's age, so our existence seems incredibly brief – like a mere second against a century of planetary history. By examining layers, we uncover valuable knowledge about the larger whole, while also learning from the individual components that comprise it.

In biological terms, layers are fundamental to our survival. We often face the loss or damage of these layers, which is part of the human experience.

Research and extensive studies show that natural teeth are primarily composed of two main layers: enamel and dentine.

In most people, tooth hues vary from orange to yellow, which primarily come from the dentine. Enamel enhances the brightness of the dentine's colour (value)

and serves as a selective filter for light.

While many studies on colour measurement ignored the mid layer – which has significant effects on intensives, opalescence and characterisations – we believe these elements are vital for effective restoration integration, just as much as the other layers.

While layering aesthetic materials, we recognise three prominent layers:

1. The inner layer (in)
2. The outer layer (out)
3. The intermediate layer (mid).

Every layer has its own characteristics and reacts differently with light. We need a full understanding of the properties of each layer – like colour, thickness, opacity, ageing, abnormalities and how time plays gracefully with them.

Fortunately, ceramic materials nowadays are getting very close to faultlessly mimicking the optics and thicknesses of natural teeth.

## THE INNER LAYER

Firstly, we call the dentine the in layer because it is located on the inside and is the deepest point of tooth formation. It is exclusively made of dentine and is responsible for chromaticity, opacity, fluorescence, light scattering and the yellowish tooth appearance.

Under normal conditions, there are two types of dentine: primary dentine, which develops during tooth germ formation, and secondary dentine, which starts forming upon contact with opposing teeth and continues throughout life.

The variation in these two developmental stages directly affects the properties of both types of dentine. This explains the desaturation phenomenon, where the centre of the tooth appears more chromatic. The base chroma (hue and chroma) is given by the dentine, which controls the chromatic nature of tooth life.

Dentine is the most abundant tissue in the tooth; it provides resistance and elasticity to the dental complex. It is physically and optically different from enamel. Generally, dentine is reddish yellow, highly chromatic, remarkably opaque and highly fluorescent due to the presence of certain proteins such as photochrome.

The physiological ageing process causes dentine to change in colour over time. Dentine thickness increases, while the diameter of the tubules, the volume of the pulp and the permeability and opacity of the dentine decrease.

This process highlights the importance of accurately replicating dentinal desaturation with restorative materials.





## THE INTERMEDIATE LAYER

Secondly, the intermediate layer is used to reproduce special features that occur naturally in enamel. It lies between the dentine and enamel and provides three kinds of mass:

- Opalescence: the transparent and iridescent effect seen as blue or grey hues, especially at the incisal third or interproximal enamel (dentine-free areas)
- Characterisation: the coloured features like white or amber bands, enamel cracks, coloured mamelons or stains
- Intensive effects: intense white features such as spots, points, clouds or bands that appear as blurred stains in natural enamel.

This thin layer is made of partially mineralised collagen protein fibre bundles that penetrate enamel and dentine. It plays a major functional role – it's highly

fluorescent, has a high value and high translucency, providing a natural appearance to the tooth. It transmits and scatters light toward the dentine, offering a sense of depth and vitality. It also provides elasticity between layers, helping absorb stress and prevent fracture spread.

Although we stratify these effects between enamel and dentine materials, in natural teeth, they normally belong to the enamel. For simplicity, we treat them as part of the intermediate layer (mid), because a good restoration cannot be achieved without accounting for these elements.

## THE OUTER LAYER

Now the last but not least, the out layer consists of all the masses used to reproduce enamel.

Enamel regulates the value or brightness of teeth and is characterised by high

translucency and unique light behaviour. It is composed mainly of hydroxyapatite and smaller amounts of organic matter and water. The structure of enamel prisms allows light to pass easily, while the organic interprismatic substance provides opacity. Without this substance, enamel would appear grey or blue.

Enamel acts as an optical fibre system – transmitting light into the dentine, which then spreads it, creating complex light effects. The combination of translucent enamel prisms and opaque interprismatic matter makes enamel both translucent and high value.

Natural enamel is both translucent and luminous, while ceramic acts as a vitreous material. This makes it hard to maintain both translucency and brightness; increasing one often decreases the other. When the thickness of translucent enamel increases, the restoration loses value and turns grey or blue – an effect known as 'killing light'.

Managing enamel thickness is essential. It varies across the tooth – more translucent at the incisal third, more opaque at the middle and cervical thirds due to the proximity of dentine. With thicker enamel, the underlying layers fade, and the blue opalescence of the incisal edge is harder to achieve. Thinner enamel produces a more intense blue effect.

In aesthetic enamel composite restorations, this effect should be enhanced with specific materials designed for incisal and interproximal areas. Although enamel has intrinsic opalescence, this must be supported with special colour masses. Enamel thickness differs from tooth to tooth; it does not necessarily correlate with size or shape but rather with the type of tooth. Over time, enamel becomes smoother, thinner and more translucent due to physiological wear. This allows light to penetrate more easily, revealing the underlying dentine, which also becomes more chromatic and dark.

## ACHIEVING NATURAL RESULTS

To reproduce a natural tooth, we need knowledge, an understanding of dental anatomy and continuous experience. Artistic skills, sensitivity and passion are also important to help us pay attention to and reproduce fine details. It's equally important to become familiar with the aesthetic materials we choose. Learn the basic concepts and start trying them out. [L](#)



# The solution to the workforce crisis?

David Smith discusses the urgent dental technician shortage and how to rebuild a skilled, future-ready workforce



**DAVID SMITH**

Dental technology lecturer,  
Yeovil College

I recently delivered a presentation on the innovative work being done at Yeovil College to help solve the workforce crisis. My lecture began by drawing attention to the alarming data on the registration of dentists and dental care professionals (DCPs) on the General Dental Council (GDC) register.

The data shows that registration for the whole dental team has increased since 2008, while there is a clear decline of registered dental technicians – a figure that has fallen every year up to its lowest level of 5,025 in 2024. Shockingly, the number of new technicians entering the UK register for 2024 was just 168. Dental technicians made up just 1.4% of the total 11,894 new registrants to enter the GDC register in 2024.

In Germany, the ratio of dentists to technicians is 2:1, while in the UK it's 9:1.

## TECHNOLOGY ADVANCEMENT

You may conclude that this decline in dental technician registration is a natural one due to the technological revolution happening within dentistry. You may even ask: 'Do we need more dental technicians?'.

Many in the industry (including dentists) are using technology to change the way they work – often to reduce lab fees – by purchasing digital equipment to manufacture devices onsite. Does this new technology come at the expense of us employing qualified technicians? Of course, we are transforming our design and manufacture from analogue manufacturing to digital design and manufacture, but the redundancy is Bunsen burners, wax instruments and model trimmers etc. The new way of design and manufacture uses digital tools, but still requires all the knowledge, understanding, creativity and skills to control the equipment and create the correct outcome.

Undoubtedly, digital manufacturing improves efficiency and productivity, but not at the expense of the real technician skills that make devices safe to be fitted in a patient and create excellent patient outcomes.

## AI CAN'T DO IT ALL

I was in a clinic not long ago with a dentist examining a recently fitted crown that had leaked and decayed. It was a full-contour restoration, and it was evident that the emergence angle of the crown had not adequately supported the soft tissue, resulting in recession and leakage. The contact points were also incorrect – the crown interfered with the occlusion and had caused wear to the opposing tooth.

We can use AI in the software to help identify the margin and adapt a library tooth to fit the margin and fill the space, but does that produce a crown that is safe to fit to a patient? It still takes time to correct the margin line, reshape the crown to have the correct

emergence angles to properly support the soft tissue, correct the contact points to allow for interproximal cleaning, and adjust the occlusion – not just in centric relation but also in group function. The crown also needs to be correctly stained, glazed and sintered to achieve the best aesthetic outcome and optimal wear characteristics.

AI will be a tool that improves productivity and reduces minor errors, but it won't know the best decisions for a specific patient – and it won't take responsibility if something goes wrong. It cannot replace the creativity and technical judgment of the dental technician.

## REVERSING THE DECLINE

So, how can we reverse this sharp decline? At Yeovil College, we've chosen to take the apprenticeship route.

We offer a Level 3 course as an entry point for school leavers and students without A-level equivalent qualifications. It runs for two years, with students spending four days in the workplace and one day at college. The delivery is blended – one week onsite, one week online.

We also offer a Level 5 course – a foundation degree in dental technology – which serves as the GDC-registerable qualification. This course lasts three years, also with four days in the workplace and one day at college, using the same blended delivery model.

I believe the apprenticeship model allows us to combine hands-on workplace training with structured college-based learning, covering all the underpinning knowledge needed to become dental professionals and meet the GDC learning outcomes.

In England, the NHS currently funds the course fees, so neither students nor employers have to pay for the training.

I believe it should become the norm for every laboratory to employ at least one apprentice. If every lab did this, we could solve the workforce shortage within five years. Everyone – teach – one. Be part of the solution. [L](#)

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# Fund your growth wisely

Ray Cox emphasises the vital importance of consistently reviewing your business's financial strategies



## RAY COX

Managing director,  
Medifinance

In life, there are very few things we don't look back on and think 'maybe I could have done it better'. Learning is a process that is inevitably accompanied by mistakes... and nothing highlights this more than running a business.

Sadly, for all the health professions, very little (if any) guidance on commerce and business practice is given to students by universities. Thus, if when the time is right, you feel you want to set up your own business, a considerable number of potential difficulties and challenges will await you.

There are, of course, some excellent business courses available and you would be well advised to research these and commit to attending, particularly any that specialise in your profession. Additionally, make every effort to take on board and retain a team of advisers who, in combination, have the skills, knowledge and experience to help give your business a sound start and keep it focused on profitable and sustainable growth. In my view, your team should include an accountant, a finance broker, a marketing consultant and perhaps a consultant to help put your business plan and strategy in place.

## MAKE MONEY WORK FOR YOU

I am now going to concentrate on what is essentially the reason why anyone wants to start and run a business. I am making the

assumption that you have chosen a caring profession because you care; but to consistently and reliably provide that care, it has to make money. And the more it makes, the more it can invest in 'doing it better'.

The important thing to recognise, from the start, is that the money market does not stand still. It is sensitive to and driven by a host of economic factors and technological changes. Without going into vast detail about the vagaries and variables of everything that influences the finance sector, I will give you one piece of advice that will stand you in good stead at whatever stage you and your business are at. It's simple... Regularly review your finance options.

To be honest, most businesses don't, and it costs them. Here are a couple of hypothetical examples to make the point:

- You set up your business a few years back and were over the moon simply to get funding. However, your business is now established and profitable, so perhaps it's a good moment to look again at the terms and conditions originally offered and maybe renegotiate

a more favourable deal from a position of strength


- Several projects and purchases have been funded over the years, resulting in a somewhat unstructured and incremental approach. It could well be financially beneficial to take a close look at your funding portfolio and the possible refinancing options.

## SEE PROBLEMS AS OPPORTUNITIES

By and large, healthcare across the board is a market sector that can withstand the ups and downs of the economy better than most. Nevertheless, issues such as sudden spikes in interest rates can make you think twice before making planned purchases and investments.

Importantly, it will also make your competitors think twice. And while they're still thinking, you have a golden opportunity to get ahead. Use it!

Another factor that may be considered a negative is inflation. This may vary over time, but it can be advantageous, especially when purchasing equipment on fixed-rate leasing, since repayment will be made with currency that has decreased in value.

Overall, my advice is simple. Take making money seriously and fund your business wisely. Good profits allow you to invest in your future, your staff and your patients. And, as Warren Buffet put it: 'Invest for the long-haul. Don't get too greedy and don't get too scared'. 

## FOR MORE INFORMATION

If you have any financial needs, large or small, immediate or long term, or would like to receive a business template from Medifinance, contact Ray Cox at **07785 7578782** or **rcox@medifinance.co.uk**



# Picture perfect

Eleanor Pittard shares best practices for photos and ads in dental laboratory marketing



## ELEANOR PITTARD

Co-director and owner of  
Hive Dental Laboratory

**S**o, what sort of images should you be taking on a daily basis? And yes, I did just say 'daily basis'. You'll find life a lot easier if you get into the habit of taking photos all the time, because when it comes to finding a good photo for your marketing, you'll have so many more to choose from.

Here are some tips:

- Use high-quality images of your lab's work, but without explicit before and after comparisons
- Showcase the craftsmanship of dentures, crowns and bridges in an artistic and professional manner. This means you need to think of things like the angles and lighting. And the background – get rid of the mess as much as you can
- Feature your team at work, highlighting the expertise of your technicians. You can stage these to be either artistic and moody shots, or fun shots of people smiling and laughing together
- Use stock images sparingly, ensuring they appear authentic and relevant
- If marketing a clinical dental technician (CDT) clinic, use images of happy patients (with consent) rather than close-ups of dental work.

By sticking to these guidelines, you can confidently promote your dental lab or CDT clinic without worrying about breaking any rules

## SPECIFIC EXAMPLES

- As a dental lab, you could post an image of a technician designing a set of dentures, with a caption explaining the precision of digital workflow in crafting custom prosthetics
- A CDT clinic could post a short video explaining the denture-fitting process, showing a clinician consulting with a patient
- A lab offering digital dentistry solutions could showcase a 3D printer or milling machine in action, emphasising innovation and accuracy.



## POSTING A FACEBOOK AD

So, now you know what to post, how do you create that post? If you are thinking of doing regular ads on Meta, I would strongly suggest you partner with a good marketing agency who can take care of the details for you. It will be their job to make micro adjustments, track results, implement improvements and keep on monitoring.

Let's face it, no business owner has time for that. But, if you are dipping a toe into the world of ads and want to give it a go, or just if you want to know the process so you can talk with more confidence to a marketing agency, then this is the basic step-by-step:

1. Go to Meta Ads Manager: visit Meta Ads Manager and log into your business account
2. Click on 'create': choose an objective that aligns with your goal (eg traffic, engagement, leads)
3. Select your audience: define demographics, location and interests (eg dental professionals, denture wearers, implant patients)

4. Choose ad placement: opt for automatic placements or manually select Facebook news feed, Instagram or stories
5. Upload your content: add your image or video (ensure it follows the rules above). Then write an engaging yet compliant caption (avoid exaggerated claims)
6. Set your budget and duration: choose a daily or lifetime budget and how long the ad should run
7. Review and publish: double-check for compliance with Advertising Standards Authority (ASA), General Dental Council (GDC), and Meta's rules before submitting.

## GROW YOUR BUSINESS

By sticking to these guidelines, you can confidently promote your dental lab or CDT clinic without worrying about breaking any rules. Staying informed about the latest advertising policies means you can focus on what really matters – delivering top-quality work and growing your business in a way that feels right for you! [L](#)

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# Inside Zirkonzahn's Molaris I and II

**Zirkonzahn** discusses the sites where the production of denture resin materials takes place, along with metal blanks, machine parts, milling burs and more than 6,000 implant prosthetics components

**Z**irkonzahn's values of rigor, precision and quality are clearly reflected in its Molaris I and II production sites, the locations where the company hosts the high tech necessary to produce its burs, machines parts, implant prosthetics components, as well as metal and resin blanks. By means of the latest turning, milling and grinding techniques, the company's range of manufactured implant prosthetics components achieves an accuracy of approximately 1/10-1/100 of a hair width, and for the implant-supported components a high-quality medical titanium alloy is used (Ti 6Al 4V ELI according to ASTM F136 and DIN EN ISO 5832 3).

The range is in constant expansion and currently comprises more than 6,000 components available for more than 140 implant systems. All components are fabricated to meet the strictest quality criteria, and to reinforce this, the company assumes the responsibility by granting up to a 30-year warranty voluntarily on all Zirkonzahn implant abutments used and their corresponding screws. The warranty also includes implants from other manufacturers used in combination with Zirkonzahn's implant abutments.

## QUALITY AND PRECISION

In Molaris I and II, the company also manufactures all milling and grinding tools for its milling systems with no involvement of third parties, creating any tool geometry and making quick and flexible adjustments in close collaboration with the in-house research and development (R&D) department. Surface coating, electroplating and diamond coating procedures are also performed in this facility, along with the production of the company's range of 200 milling burs – with different geometries and shank diameters (3 and 6mm) – milling unit parts and colouring liquids.

The company's blanks of Sinternit, the firm's sinter metal, are also produced in this location, where injection moulding machines are also used to inject more than 10 different types of resins into discs and to provide them with different colours or colour gradients.

Finally, to ensure safety and prevent breakdowns, the same task is performed by two machines and measurement equipment. In addition, technical testing (eg optical and tactile 3D measuring, hardness and roughness measuring, microscopic analysis etc) is carried out to guarantee quality and precision.

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## FOR MORE INFORMATION

Have a look with your own eyes! For more information or to arrange a company tour, visit [www.zirkonzahn.com](http://www.zirkonzahn.com) or contact Carmen Ausserhofer at +39 0474 06 6662 or [carmen.ausserhofer@zirkonzahn.com](mailto:carmen.ausserhofer@zirkonzahn.com)



Sinternit blanks – the company's sinter metal



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One of the company's three production halls dedicated to implant prosthetics components





r.zirkonzahn.com/f6d

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# Setting new standards for inspection instruments

**Vision Engineering** details how its new OPTA Stereo Microscope is designed to improve workflows as well as precision

**V**ision Engineering, a leader in advanced optical solutions, has launched OPTA Stereo Microscope, engineered to meet the exacting demands of modern dental laboratories.

OPTA Stereo Microscope is poised to improve workflows, enhance precision and elevate the quality of dental prosthetics, through designed-in ergonomics, high quality image presentation and long working distance, making it an indispensable tool for dental technicians worldwide.

In the dental lab industry, the smallest detail can significantly impact patient outcomes. Recognising this critical need for unparalleled accuracy and efficiency, Vision Engineering has developed a microscope that not only delivers superior optical performance for under £1,000, but also integrates seamlessly into the fast-paced lab environment.

'We are delighted to introduce the OPTA Stereo Microscope to the dental community,' says Dr Tony Lang, international sales manager. 'Our team understands the challenges of dental technicians and has developed a solution that addresses them head-on. This microscope isn't just about magnification; it's about empowering

technicians to achieve new levels of precision more comfortably for longer, reduce material waste, and ultimately deliver a higher standard of care through their work.'

## KEY FEATURES AND BENEFITS

### Exceptional optical clarity

The OPTA microscope boasts advanced objectives, providing crisp, high-resolution 3D imaging across 4x, 6x, and 8x magnifications. This clarity is crucial for intricate tasks such as margin refinement, ceramic layering and framework inspection.

### Patented technology

OPTA's innovative eyepiece-less design delivers an unrivalled 3D stereo view, offering you the ability to examine objects from multiple angles with unmatched clarity and precision.

### Ergonomic design for prolonged use

Engineered with the technician's comfort in mind, its ergonomic stand, adjustable head and intuitive controls minimise strain during long working hours, promoting efficiency and reducing fatigue.

### Enhanced depth of field

A superior depth of field ensures that multiple layers of complex dental restorations remain in sharp focus simultaneously, simplifying inspection and increasing accuracy.

### Robust and stable construction

Built for durability, the OPTA Stereo Microscope provides a stable platform for delicate work, reducing vibrations and ensuring consistent performance in a busy lab setting.



**An indispensable tool for dental technicians worldwide**

## INVALUABLE ASSET

OPTA Stereo Microscope empowers dental technicians to meticulously inspect impressions, dies, wax-ups, frameworks and final restorations with unprecedented detail. This leads to improved fit and aesthetics of crowns, bridges, dentures and implants, ultimately enhancing patient satisfaction and reducing costly remakes.

Furthermore, its ability to facilitate precise quality control at every stage of production makes it an invaluable asset for maintaining consistency and excellence.

OPTA Stereo Microscope is available to order now. Prices start at £900.

## FOR MORE INFORMATION

on detailed specifications, pricing and to place your order, contact Dr Tony Lang at [dental@visioneng.co.uk](mailto:dental@visioneng.co.uk) or 01483 248300. Alternatively, visit [www.visioneng.com/products/opta](http://www.visioneng.com/products/opta)



NEW



# OPTA

Improve your inspections with the **NEW** OPTA stereo microscope for Dental applications



## Why magnification matters:

- Precision is key in dental applications for creating accurate, comfortable, and natural-looking restorations.
- Magnification helps technicians spot details the naked eye might miss, improving outcomes and reducing remakes.

## Magnification Ranges:

**4x-6x:** Wide view for inspecting impressions, denture fit, and surface details.

**6x-8x:** Ideal for defining margins and final checks.

## Benefits of Magnification:

- Ensures thorough sterilisation checks.
- Supports accurate colour matching with LED lighting for natural shade evaluation.
- Enhances workflows by spotting minor flaws in digital or physical models.

## Why OPTA Stereo Microscope:

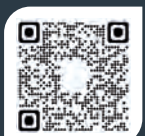
- Ergonomic, eyepiece-less design reduces fatigue.
- Provides 3D imaging with 4x, 6x, and 8x lenses.
- Built-in daylight LEDs for accurate colour rendering.
- Flexible stand options: square, crescent, or universal arm.

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- + Cleaning programmes are customised for the different resin types and objects



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On the other hand, Denture Gingiva Basic Mono Pink is a gingiva-coloured resin with improved flexural strength and fracture resistance, specifically conceived for the production of denture bases. The resin blanks are also available in Ø 125mm for the manufacture of up to two denture bases in just one milling process.

The gingival area of the restorations can be characterised individually with Gingiva-Composites. Their colour spectrum is based on the company's Ice Ceramic tissue shades from light to dark: when used as temporary restorations, dentists and patients can get an immediate impression of the final prostheses.

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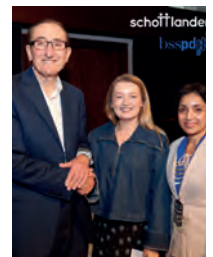


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## Schottlander Poster Prize at BSSPD Schottlander

From an entry of 26 posters, the winner this year was Bethany Revert from St George's University Hospitals NHS Trust for her poster 'Surgical management and dental rehabilitation of a Brown's tumour in the anterior maxilla'. The case report described the multidisciplinary care of a rare case of a Brown's tumour located in the anterior maxilla, occurring as a side effect of secondary hyperparathyroidism.

[schottlander.com](http://schottlander.com)



## Schottlander Oral Presentation Prize Schottlander

The winner of this prestigious prize was Eda Dzinovic from King's College, London. Her presentation was entitled 'Advancing dental materials with high-fidelity octopus-inspired suction cups'.

This research opens the possibility of improving the rather limited adhesion of PMMA to the mucosa, thereby improving retention and reducing the reliability on denture adhesive creams.

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# The evolution of dental zirconia

**Stefan Roozen** explores the transformation of dental zirconia from a single composition to a complex, varied material



**STEFAN ROOZEN**  
Dental technician

**D**ental zirconia has evolved considerably over the last 20 years. It has evolved from a material with a single composition to a complex material with variations in yttria and alumina content, grain size and the number of layers. These changes have resulted in a wide range of zirconia products with different mechanical and optical properties.

## FIRST GENERATION ZIRCONIA

The first zirconia to be introduced in dentistry was yttrium-stabilised tetragonal zirconia polycrystals (Y-TZP), which consist mainly of the tetragonal phase and are stabilised with 3mol% yttrium oxide (3Y-TZP).

This material, also known as first generation zirconia, has the highest mechanical properties of all zirconia variations.

It is very opaque and is therefore mainly used as a framework material, which must also be veneered with ceramic to achieve a natural-looking restoration.

However, its high opacity can be used to cover dark surfaces (Figures 1 to 3).

## FURTHER DEVELOPMENT

In order to improve the opaque appearance of zirconia, the alumina-oxide content ( $\text{Al}_2\text{O}_3$ ) in 3Y-TZP was first reduced and the porosity eliminated by sintering at higher temperatures. The result was monolithic 3Y-TZP, also known as second generation zirconia, with improved optical properties (Figures 4 and 5).

However, this increase in translucency is accompanied by a reduction in flexural strength and fracture toughness.



**FIGURES 1 and 2:** The high opacity of 3Y-TZP (first generation) can neutralise dark surfaces



**FIGURE 3:** Further aesthetics are achieved with veneering ceramic GC Initial Zr-FS

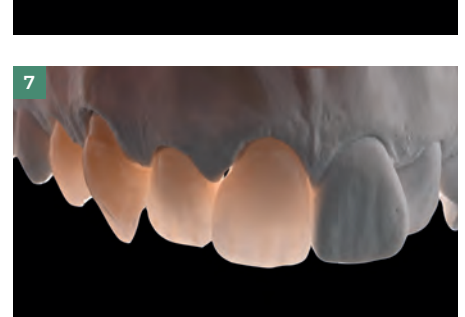
## INCREASING THE CUBIC PHASE

Although these modifications improved the translucency of 3Y-TZP, clinicians wanted an even higher translucency for monolithic restorations. This led to the development of the third generation of partially stabilised zirconia with a higher yttria content, 5Y-TZP (Figures 6 and 7).

This variant has a higher cubic phase content, which leads to increased translucency but reduced mechanical properties (600-800MPa).



**FIGURES 4 and 5:** Second generation zirconia from 2007, glazed with the first version of GC's Lustre Pastes – GC Initial IQ Lustre Pastes NF



**FIGURES 6 and 7:** GC Initial Zirconia Disk UHT (5Y-TZP) exhibits increased translucency due to the higher proportion of yttrium oxide. Colour customisation and glazing with GC Initial IQ Lustre Pastes One

With 4Y-TZP, an extension of the possibilities was created to optimise the compromise between translucency and stability for long-span bridge indications.

### COLOUR CUSTOMISATION OF ZIRCONIA

In addition to the option of glazing zirconia with glazing pastes, colouring liquids can also be used for pigmentation before the sintering process.

GC Initial Zirconia Coloring Liquid, for example, contains metallic oxides such as iron, chromium and manganese oxides, which are applied before sintering to enable the natural colour gradient (Figures 8 to 10).

### ZIRCONIA TREND: MULTI-GENERATIONS ZIRCONIA

The market trend is now moving towards multi-generation zirconia (3Y-TZP/5Y-TZP), in which CAD/CAM discs have a fracture-resistant zirconia generation with a lower yttrium content at the bottom and a more translucent generation with a higher yttrium oxide content at the top.

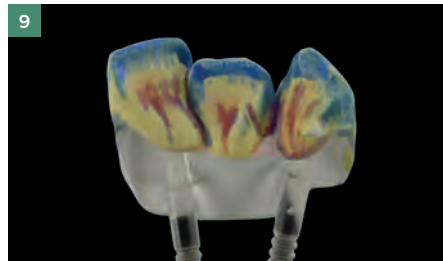
Newer generations of zirconia include multi-layered and polychromatic materials where colour gradients are achieved by adding pigments to different layers to mimic the colour and translucency of natural teeth (Figures 11 to 13).

### MICRO-LAYERING

Zirconia continues to be combined with veneering ceramics to raise it to the highest standards.

Micro-layering has established itself as the new standard for achieving the desired aesthetics, particularly when using highly stable types of zirconia.

This has also led to new material developments in the field of veneering



**FIGURES 8 to 10:** Colour individualisation of GC Initial Zirconia Disk HT (3Y-TZP) with GC Initial Zirconia Coloring Liquid

ceramics. The new so-called Sqip ceramics have a very high degree of homogeneity. As a result, this minimises sintering shrinkage and eliminates the need for multiple firing cycles (Figures 14 and 15).

### CONCLUSION

The development of dental zirconia in its composition and properties over the last two decades has resulted in a variety of zirconia types.

Early generations, particularly 3Y-TZP, offer high strength but are not translucent, so veneering is required. In

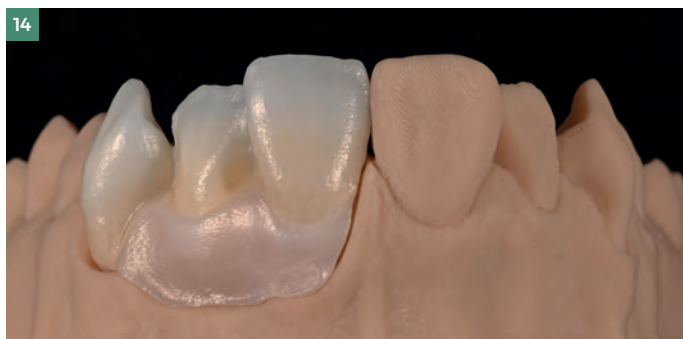


**FIGURES 11 to 13:** Multi-generation zirconia is more translucent in the incisal area and has a colour gradient from cervical to incisal to mimic the colour and translucency of natural teeth. GC Initial Zirconia Disk Multilayer Elite was used

subsequent generations, modifications were made to improve optical properties, although this was often at the expense of mechanical strength.

Current trends include multi-layered zirconia with varying levels of yttria to mimic natural tooth colour and translucency, often combined with innovative veneering techniques for improved aesthetics.

The use of colouring liquids and glazing pastes also helps to create natural-looking restorations. **L**



**FIGURES 14 and 15:** Highly stable 3Y-TZP, 1200 MPa (GC Initial Zirconia Disk HT), customised with GC Zirconia Coloring Liquid and minimally veneered with 0.3 mm GC Initial IQ One Sqip

# Zirconia solutions

Strong solutions for beautiful teeth

**GC Initial Zirconia Coloring Liquid**  
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**GC Initial IQ ONE SQIN**  
The paintable colour-and-form  
ceramic system



**GC Initial Zirconia Disk  
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Zirconium oxide  
CAD/CAM disks



**GC Initial Zr-FS**  
Feldspar based zirconium  
oxide veneering ceramic



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# Enhanced CPD

## LAB/SUMMER/ALLSOPP/PAGE 11

### 1. What was the main reason for extracting the upper right central incisor?

- ☐ a. The tooth was fractured and non-restorable
- ☐ b. It had a large carious lesion
- ☐ c. There was a significant recurrent infection with limited restorative potential
- ☐ d. The patient requested it for aesthetic reasons only

### 2. Why was guided bone regeneration chosen instead of simple ridge preservation?

- ☐ a. Both sites required soft tissue augmentation
- ☐ b. A sinus lift was needed
- ☐ c. Only one site had a bone defect
- ☐ d. Both implant sites required significant bone regeneration

### 3. What was the purpose of the provisional restorations during the healing phase?

- ☐ a. To act as final restorations for aesthetic evaluation
- ☐ b. To provide basic chewing function only
- ☐ c. To develop soft tissue contours and the emergence profile
- ☐ d. To prevent bone resorption

### 4. What was the main benefit of using a connective tissue graft during soft tissue management?

- ☐ a. To close the extraction site completely
- ☐ b. To create a more natural emergence profile
- ☐ c. To anchor the implant more securely
- ☐ d. To prevent staining of the final restoration

## LAB/SUMMER/POTTER/PAGE 14

### 1. What was the patient's main concern regarding the final appearance?

- ☐ a. That they be the exact same shade as the natural teeth
- ☐ b. That they appear slightly lighter with controlled characterisation
- ☐ c. That they match the colour of the canine precisely
- ☐ d. That they have no translucency or crack lines at all

### 2. Why did the technician add many of the effects during the porcelain layering stage rather than surface staining?

- ☐ a. The technician was more experienced in layering
- ☐ b. The natural teeth had deep crack lines and translucency
- ☐ c. Staining was not permitted for this type of restoration
- ☐ d. The patient requested a completely stain-free result

### 3. How did the technician ensure accurate shade matching?

- ☐ a. By relying solely on a shade guide
- ☐ b. By using only memory and written notes from the clinician
- ☐ c. By creating a personalised colour map with reference photos
- ☐ d. By estimating the colour by comparing to a similar case

### 4. What was a key factor in the success of this complex case, according to the technician?

- ☐ a. Completing all steps without clinical input
- ☐ b. Following a rigid, standardised workflow
- ☐ c. Collaborating with the clinical team and using patient input
- ☐ d. Keeping the restoration process secret



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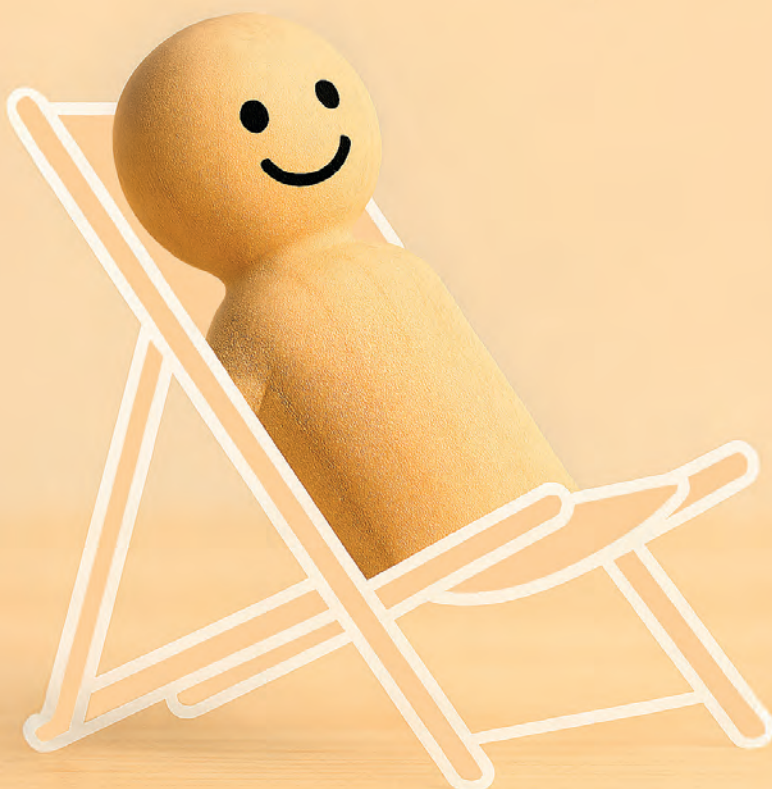
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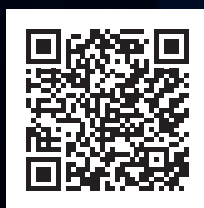
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