A t the end of last year, I welcomed the new Lava Chairside Oral Scanner (C.O.S) from 3M ESPE into my practice. The scanner handles like an overgrown intra oral camera and offers brand new video capture technology that creates a 3D image simultaneously live on screen as you scan the patient’s teeth.

I have a somewhat old fashioned arrangement, by having a dental laboratory within my practice. As a result, I decided to install the Lava Scan ST scanner and software in the laboratory to back up the clinical Lava C.O.S scanner. Together with my technician, Frank Warburton, we had a very intense week of training to come to grips with all the new features that CAD/CAM can bring to dentistry. We have made a considerable leap forward in the complete digital workflow as envisaged by 3M ESPE.

I hope to share with you my journey into this brave new world of advanced technology, and highlight the considerable advantages that I see digital dentistry bringing to my workplace, and of course the benefits to my patients.

One of my first cases is a gentleman who was just coming to the end of a complete rehabilitation having presented in his early forties with a considerable amount of wear. Conventional impressions using 3M ESPE’s Impregum polyether material had been used for his restorations but two final upper restorations were required on the first premolars and this seemed a suitable beginning for my intra oral scanning.

Following processing, the electronic image is transmitted back to my laboratory for margin marking and selection of the model holder using the Lava C.O.S laboratory software. On completion, the files are transmitted to a model-making facility where a SLA (Stereolithography) model is produced. This process in my opinion is very high tech and results in a high quality resin model, which is then shipped back to me in just three days.

The flexibility of this system now allows me to choose whichever type of restoration is appropriate. For the upper right premolar, a Lava zirconia core was ordered and a pressable ce-

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**The Lava Chairside Oral Scanner (C.O.S) at work**

Dr James Hooper from The Dental Practice in Hove sets out to highlight the advantages of using the Lava C.O.S through a new series of detailed clinical case studies.

---

**Advanced scanning technology**

Dr James Hooper highlights the advantages digital dentistry can bring to your practice and in turn patients.

**Introducing Invisalign**

The simple orthodontic system can be easily implemented into any existing orthodontic practice, says Dr Schwartz.

**Digital dimension**

To meet patient demand, it’s essential that you keep up with new trends and technology, says Neil Photay & David Hands of Costech.

**Avoiding clasps**

Ulrich Heker discusses techniques in precision dental prosthetics with highly engineered connections.

---

**Upper left premolar before treatment**
Looking at the upper left premolar this was lightly prepared for a porcelain veneer.

The scanned image on the Lava C.O.S monitor

High-quality resin model (this picture and below)

Dr James Hooper owns The Dental Practice in Hove. He graduated from Guy’s Hospital in 1981 and worked in a large practice for four years, before opening his practice in 1985. Dr Hooper achieved the Member of the Faculty of General Dental Practitioners in 1990. In 1994 he commenced training for using dental implants, which is now an important part of the practice. He has been working with the Lava C.O.S since the beginning of this year.

Upper right premolar – Lava Zirconia Core

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Watch our LIVE webinar with Dr. James Hooper of The Dental Practice, Hove on Wednesday 26th May at 7pm and hear his thoughts on the machine and how he has used it to develop his practice.

Dr James Hooper owns The Dental Practice in Hove. He graduated from Guy’s Hospital in 1981 and worked in a large practice for four years, before opening his practice in 1985. Dr Hooper achieved the Member of the Faculty of General Dental Practitioners in 1990. In 1994 he commenced training for using dental implants, which is now an important part of the practice. He has been working with the Lava C.O.S since the beginning of this year.

Could this be made with conventional impressions? Of course, but the digital image is free of any distortion and the resin model is cleaner and more resilient than a conventional die stone.

In my next article I shall show how incredibly accurate the occlusal record can be. This just knocks spots off any other digital image taking system and puts 3M ESPE firmly at the forefront of this exciting new technology. For more information, visit www.3mespe.co.uk.

ramic veneer was fabricated for the upper left.
Implementing Invisalign

Many practitioners are not aware of the wide range of cases the Invisalign system can treat, insists Dr Benjamin Schwartz, who offers some examples of its flexibility.

The objective of this article is to show how Invisalign treatment can easily be implemented into any existing dental office. Being able to recognise which patients are potential candidates will be the first step in achieving a successful outcome. After reading this article, you should be familiar with the Invisalign criteria and be ready to implement this versatile treatment adjunctive into your practice.

Do you have any patients whose teeth look similar to those? These cases are typical of patients that frequently come into a dental office. Many patients do have some sort of misalignment, overlapping, or spacing present in their teeth. The objective of this article is to demonstrate how these types of cases (and many others), can be readily treated using the Invisalign system.

Align Technology manufactures Invisalign; a custom-made series of clear aligners used to orthodontically rotate, move, and align teeth. The Invisalign process is straightforward, and allows the practitioner to have full control over the course of treatment.

Invisalign is indicated for patients with up to five millimeters of crowding and/or spacing per dental arch. Rotations can be corrected within a range from five to forty degrees. Approximately between two to four millimeters of overjet or overbite can be relieved using Invisalign.

Once a suitable candidate has been selected, and no caries or periodontal issues are noted, detailed polyvinylsiloxane (PVS) impressions are to be taken for both arches. In addition, a bite registration is taken along with a series of extra-oral and intra-oral photographs. The graphic requirements are a full face photo, smile shot, profile, anterior teeth, right lateral, left lateral, maxillary and mandibular arches. These are then sent to Invisalign for the patient’s customized ClinCheck to be created.

ClinCheck (Fig. 2) is a 3D virtual movie of the teeth based upon the impressions sent to Invisalign. Treatment progression can be played out to mimic the natural movements of the teeth. This allows the practitioner to visualise the final phase of treatment, and make any adjustments as needed. Once the layout has been designed and approved, aligners are made in sequence based upon the projected ClinCheck models.

In certain cases, interproximal reduction (IPR) may be necessary. IPR allows the practitioner to create room in an otherwise constricted area, so that there is adequate space for the necessary tooth rotations or repositioning. IPR is achieved with the use of diamond strips and/or rotary disks, and is prepared before the actual tooth movements occur.

The patient wears each set of aligners for a two-week period. Aligners are worn full time, except when eating, drinking, and performing oral hygiene. During this phase, the patient is typically seen every month to monitor treatment progression and adjust the layout as needed.

Many practitioners are not aware of the wide range of cases the Invisalign system can treat, insists Dr Benjamin Schwartz, who offers some examples of its flexibility.
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CAD/CAM set to rise
Analysis shows digital impression technology taking a popular choice in dental care

Digital impression-taking technology is set to see double digit growth rates as laboratory technicians and dentists adopt this highly flexible, quick, and accurate solution to manufacturing and fitting dental restorations.

According to DentalProductsReport.com, the US market for digital impression-taking systems is estimated to reach $83.5 million by 2015, with the UK braced to follow suit.

In 2008, the US market for digital impression-taking systems increased by 75 per cent over 2007, following new technology as well as continued investment by laboratory technicians and dentists.

Commenting on the report, Julian Dorey, laboratory technician at the Kingsbridge dental laboratory, who uses the Lava chairside oral scanner (C.O.S) laboratory software from 3M ESPE said: ‘The Lava C.O.S is the only software that comes through to the laboratory and takes both the impression and makes a model - it’s definitely the way forward.

He continued: “It has increased accuracy and the fit is considerably better now, and it certainly has the potential to improve the working relationship between dentists and laboratory technicians.”

The primary advantages of using a digital impression system over traditional processes is the elimination of many manual steps involved in creating a restoration.

The technology produces a more accurate restoration because the three-dimensional image is produced instantly, allowing the dentist to make any adjustments necessary to the prep site in real time.

Digital impression-taking technology offers many procedural enhancements for manufacturing and fitting dental restorations.

The Lava C.O.S is able to take an accurate digital impression of the teeth, instantly uploading the image and allowing the dentist to make any corrections or changes to the patient’s prepped dentition.

The benefits for the laboratory are impressive. For example, with the Lava C.O.S, there is an uninterrupted ‘digital workflow’ process meaning time-consuming steps such as plaster pouring, base and pin, die cutting, trimming, articulation and scanning are eliminated.

This process also eliminates the risk associated with a traditional physical impression changing size or shape during transportation, which can lead to an inaccurate final restoration.

According to a US market report for Dental Prosthetic Devices 2009, clinical studies have shown restoration remakes have been reduced from an average of five per cent using traditional methods, to less than 1 per cent with digital impression-taking systems. Following a typical life cycle of an emerging market, digital impression-taking systems are still in their embryonic stage, where the market is still developing.

According to the report, early clinical studies are encouraging as they have shown high levels of success, and are paving the way for more practitioners to adopt the technology.

More than 25,000 cases have now been produced with the Lava C.O.S, for further information on this device and the 3M ESPE digital workflow process, please visit www.3mespe.co.uk/lavacos or call 0845 602 5094.

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Embracing change

It's all too easy to stick to what you know when it comes to the treatments you offer and technology you use, but to meet patient demand, you have to keep up with new trends. Neil Photay and David Hands of Costech explain

The field of dental technology is constantly evolving, and while the market for cosmetic dentistry continues to grow, science continues to respond – producing products designed to meet customer demands.

With this in mind, it is important that all practitioners ensure they keep up with the latest treatment options, and are able to offer patients the most-up-to-date products and procedures. Most professionals are open to trying new things, but it can be scary putting your faith, and finances, into an unknown. Nevertheless, there are laboratories that work hard to ensure the products they offer provide the best in aesthetics and durability. With this along with several education programmes designed to explain and demystify, there is very little for the dentist to fear.

Stuck in a rut?

It is very simple to get stuck in a routine. Many practitioners understand that whilst their favoured lab may provide the most up-to-date products possible, the older products have always done the job just fine, and argue that this is a perfect case of, ‘if it ain’t broke, don’t fix it’.

In 700 BC, it was common practice when repairing or replacing missing or broken teeth to simply remove the tooth, and replace it with a ‘substitute’ tooth, commonly taken from another human or even an animal. The substitutes were fastened to the existing teeth with gold bands and wires, and evidently filled the gap nicely. The procedure obviously worked, however it is hard to imagine that a modern patient would be very happy with this form of treatment now!

With this in mind, it is important to remember that just because something works, doesn’t mean it cannot be developed.

Embracing change in dental treatment

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Accreditation Seminars for 2010

Accreditation Seminars for 2010

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Clearstep Advanced Hands On Course dates for 2010

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in order to help it to work better. It may be consoling to know exactly what to expect, but staying too long in your comfort zone can have detrimental effects on both patient and pro in dental science mean that we have been able to put their faith in the technicians and explore new treatment techniques.

**Suggesting new treatment**

It is understandable to be concerned about the reaction from patients when you suggest a radical new treatment option. It is likely that your patient may have carried out some prior research into various options, maybe even spoken to someone who has had similar treatment, and has an idea of what to expect. However, patients are primarily led by two aspects when considering treatment: the advice of their dentist, and the cost involved. Patients inherently trust their dentist's advice, and if you are able to suggest a treatment plan that offers them aesthetic appeal, durability and simplicity, the reaction is likely to be a positive one.

**Securing best results**

It is undeniable that some of the newer technologies may be slightly more expensive than the more out-dated options. However, many patients are willing to spend that little bit extra to secure the very best end result. In terms of cost-effectiveness, a treatment plan that offers added durability and minimal after-care is usually a better option than the more traditional options, which can be prone to breakages, discoloration, and may not offer the very best biocompatibility.

To make the most of the advances in dental science, you cannot be shy when it comes to embracing change.

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**About the author**

**Neil Photay**carries on his family tradition of working in the dental industry and creating and manufacturing dental innovations and technologies. Working at both the CosTech Laboratory and family dental surgeries from the age of 16, Neil completed a BSc in computer science, specialising in project and team management at Brunel University before returning to the CosTech Elite laboratory in 2005.

**David Hands**studied dental technology at Lambeth College in 1999 achieving a BTECH National Diploma in science and dental technology, and an advanced HNC/HND in dental technology. He then went on to study advanced aesthetics and smile design with Master Technicians in the US, gaining the Master Technician status. David joined CosTech in 2004 and quickly became head ceramist.

Together, Neil and David began jointly managing CosTech Elite in 2006, developing the advanced team structure and skills and forging strong relationships with all the CosTech customers.

For more information on CosTech Elite Dental Laboratory or for a free pack, call 01474 320076 or visit www.costech.co.uk.
No clasps, please!

Ulrich Heker discusses techniques in precision dental prosthetics with highly engineered connections

Precision connecting elements including telescopic crowns and attachments are favoured solutions in many European countries, where patients are increasingly conscious of their aesthetic potential, practicality and cost-effectiveness. The methods are within the reach of UK dental practitioners with recourse to quality dental technicians. This article gives an illustrated overview of the fundamental principles of these techniques.

No clasps please!

“Please do not force me to have those ugly clasps with my new teeth!” you, as a practitioner, will all too often have heard patients exclaim. After all, who wants ancient teeth smiling from between young lips since it’s commonly suggested that ‘a smile is the mirror of the soul’?

Armed with Ayurveda, aromatherapy and Botox, today’s patient puts an increasing value on their health and a cultivated appearance in the pursuit of beauty. This of course includes dental treatment and consequently, interest in unobtrusive and invisible dental replacements without clasps is continuously rising.

In Germany, this need is met using precision connecting elements and a combination of permanent and removable replacements. These combination prosthetics provide a very comfortable and aesthetic solution, particularly where the remaining natural teeth still provide a stable foundation.

Combined dental replacement is generally applied when a completely fixed replacement is not feasible anymore. This can also be in part for cost reasons, when a pure bridge construction becomes too expensive.

Precision connecting elements

In order to obtain a secure fit of the prosthesis, several or all of the remaining natural teeth are capped with a permanent crown. Precision connecting elements are then incorporated as part of, or attached to, the crown using an attachment that can be interlocking or press-stud anchors. Alternatively, the whole crowned tooth acts as a stable attachment - as with all double crown work. The prosthesis is firmly linked to the rest of the natural teeth via the attachment; however, it can be removed by the patient for the usual cleaning regime.

The methods mentioned here are not particularly ‘cool’, new applications; rather they have their origin in America in the 20th century. The anchoring of partial or hybrid prostheses with individually manufactured double crowns was first described by Peeso (1916) and Goslee (1925). Precision connecting elements come in a variety of forms, of which two will be considered here: a) treatments using double crowns and b) treatments using attachments.

Double or “telescopic” crowns

A telescopic crown always comprises two parts; the primary crown, or coping, which is permanently fixed in the mouth and preferably made from a suitable gold alloy and the mounted, removable telescopic crown or secondary crown, attached to the prosthesis and made of the same material. Telescopic crowns are parallel-faced double crowns with a perfect fit. Ideal adhesion is achieved when the inner and outer crowns are perfectly cylindrical.

As this is not feasible for a variety of reasons, at least two
opposing surfaces (often the distal and mesial dental surface) are made parallel to one another. This needs to be considered during preparation.

Using the resilience telescope is a frequently used solution, where there are only a few (one to three) existing teeth. Here, there is a 0.3mm to 0.5mm space between the primary and secondary crown on the occlusal face of the telescope. This means that the prosthesis rests on the mucosa – when it is not under pressure. The “resilience gap” is only removed with pressure of chewing and there is a particularly gentle load or strain on the remaining natural teeth. This form of telescope is the foundation for the so called “cover denture” prosthesis. Externally, it is indistinguishable from a full prosthesis.

The secondary crown is worked into the prosthesis (soldered, glued or embedded with retention within the synthetic matrix of the prosthesis. Only after the final fitting is the primary crown cemented firmly onto the prepared tooth stump. Telescopes are, next to attachments, seen as standard in Germany, Switzerland and Scandinavia for the treatment of larger dental gaps using a removable prosthesis. The construction of telescopic prosthetics requires a high standard of preparation and processing by the dentist and their dental laboratory.

Working with attachments
Like telescopes, attachments are invisible, firm anchoring, which can be released by the patient themselves. The male attachment elements (in this instance: Precivertix extracoronally) are attached to the crown blocks or bridges, while the relevant complementary element is attached to the removable dentures.

Attachments are prefabricated (off-the-shelf attachments) and are then joined to the bespoke denture in the lab (creating bespoke attachments). Attachments are also classified according to their fitting; either fitting into the anchor tooth (intracoronarial attachments) or those with fittings external to the tooth (extracoronral attachments).

An attachment always comprises two parts; the receptive (or the female) part, and the insertion (or male) part. Which part sits on the crown and which on the removable denture depends on the manufacturer and the practitioner’s judgement on a given situation. Particularly popular versions are Precivertix and Rod Attachments and similar forms.

You can distinguish attachments according to the attachment mechanism: a) friction attachments (female and male components are joined by their precise fit – similar to telescopic attachments). b) Retentive attachments (the hold is achieved by using elastic elements which rest in grooves or indentations). c) The attachment can also be fitted with a bolt for optimal fastening.

‘The methods mentioned here are not particularly ’cool’, new applications; rather they have their origin in America in the 20th century. The anchoring of partial or hybrid prostheses with individually manufactured double crowns was first described by Peeso (1916) and Goslee (1923)”
Getting started
Taking on combination methods into your own treatment palette is certainly possible without attending dozens of seminars and reading numerous text books that are in any case frequently unavailable in English.

Viewed objectively, an attachment project is nothing more than a larger bridge for the practitioner or a pair of integral crowns to which something is added in the lab. The parallel features are created, so to speak, by the technician.

With telescope work, this is perhaps a bit more challenging. Here you need to follow a particular workflow in order to prepare the relevant teeth, so that they can be considered as a “anchor group” and display the optimal parallelism. This leads to slender inner telescopes and thus to an unobtrusive total view with the completed work.

The most frequently prepared telescopic prosthesis is in the lower jaw with two telescopes on the still existing canines; this is effectively the “entry level” model. The collaboration between the dentist and the dental technician really comes into play here. Taking all things together and with good planning in place, this not a difficult process at all.

Conclusion
Combined dental replacement is the best method to meet the demands of the patient and practitioner without compromise. Combined dental replacement without clasps offers a high comfort for the wearer, more confidence and a very appealing aesthetic. Which combined dental replacement and which connecting elements form the best solution is determined by the professional with each individual patient.

The methods and techniques shown here do not represent a stand alone solution for partial dental replacement. Far from it! Combination methods can really come into their own when used together with implants. They give the practitioner the opportunity to find optimal solutions for the patient, who might otherwise only be treated with difficulty or not at all.

About the author
Ulrich Heker is the owner-manager of Ulrich Heker Dental Laboratory, founded in 1996 with the strap line TEETH ‘R’ US. As a qualified master craftsman (German Master Dental Technician) since 1991, he has over 26 years’ experience both at the bench and in running a successful business. Ulrich lives in Mülheim on the river Ruhr and is an accomplished western-style rider in his spare time. Ulrich is fluent in English and can readily be contacted by calling +49 201 797 955, visiting www.german-smile.info, or emailing Ulrich@Teethrus.de.

References