

# Solutions for Dentistry.

## Brush up on dental news



## Simplification of the indirect restoration.

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# Temporary restoration: The unsung hero

A high-quality temporary will make a dental practitioner's life easier. The author of this article discusses the strengths and weaknesses of different material classes and techniques.

The temporary is probably the most undervalued element in the prosthodontic procedure. Rather than just serving as a space filler, it is a tool enabling dental practitioners to provide optimal conditions for subsequent steps such as impression taking and cementation and the necessary predictability for a successful final restoration. In addition, it is used as a mock-up of the final restoration, which allows for an aesthetic and functional evaluation as well as – in some cases – a therapeutic clinical test drive. When done with too little care, an inadequate temporary can lead to unhealthy soft tissue, post-op sensitivities or, especially in anterior implant cases, unsatisfying pink/white aesthetics.

For the production of a high-quality temporary restoration, several factors need to be respected. These include the selection of a high-performance material offering proven properties such as a high flexural strength and dimensional stability, and the use of an appropriate production technique.

## Available materials

#### Essentially, there are four different types of temporisation materials to choose from:

- Methacrylate resins
  - -formed composite erowne
- Bis-acrylic (composite) resins
- Pre-formed composite crowns
   PMMA discs for CAD/CAM production

The range of indications is limited for the latter two: The pre-formed composite crown is only available for single units in the posterior region. The production of temporaries from PMMA discs involves a lot of time, effort and cost. Consequently, this option is only interesting for particularly complex rehabilitations. For most indications, the choice is thus between methacrylate and bis-acrylic resins.

## **Bis-acrylic or methacrylate resins?**

The are many reasons for choosing bis-acrylic resins over traditional methacrylate resins: The former materials offer better mechanical properties like a higher flexural strength and hardness, superior dimensional stability, a higher aesthetic potential, a low polymerisation shrinkage and setting temperature for higher patient comfort, and better mixing quality as they usually come in an automix syringe. Moreover, they stand out due to their ease of use. The only arguments in favor of methacrylate resins are their high fracture resistance (at the expense of dimensional stability) and low cost.<sup>1,2</sup>

Hence, it comes as no surprise that bis-acrylic resins are preferable for the majority of temporisation procedures. The materials work well for temporisation on teeth and implants, are indicated for the production of single-unit and multi-unit restorations and are suitable for short-term and long-term temporisation. They may be processed chairside or in the dental laboratory, depending on the existence of a tooth anatomy at the beginning of the procedure.



# Methacrylate resin versus Bis-acrylic resin:

Overview of beneficial material properties.

#### **Methacrylate Resin**

- High fracture resistance (at the expense of dimensional stability)
- Low material cost

#### **Bis-acrylic / Composite Resins**

- High mechanical strength
- High dimensional stability
- Superior aesthetics
- Better mixing quality (automix)
- Low polymerisation shrinkage
- Lower setting temperature
- Ease of use

### Production of a bis-acrylic temporary

No matter how a provisional crown or bridge is produced, it needs to be designed for optimal conditioning of the soft tissues. This is a relevant aspect for implant- and tooth-based restorations with subgingival margins. In this case, the soft tissue usually needs time to recover from tooth preparation, and ideal tissue management with the aid of the temporary will ensure easier exposure of the margins during impression taking and the desired dry, clean working field during cementation of the final prosthetic work.

Whenever teeth with a pre-existing anatomy need to be restored, chairside matrix production is usually possible. A preliminary impression is taken, filled with bis-acrylic resin and placed in the patient's mouth to obtain the desired shape of the temporary. The process is completed with careful adjustments especially in the area of the restoration margin. With some materials like Protemp<sup>™</sup> 4 Temporisation Material, the restorations' surfaces become glossy just by wiping with ethanol.

### Case 1



Fig 1: Initial clinical situation with a PFM crown on the second premolar that needs to be replaced.



**Fig 4:** Temporary in the matrix after setting in the mouth (3M<sup>™</sup> Protemp<sup>™</sup> 4 Temporisation Material).



Fig 2: Clinical situation after crown removal and tooth preparation.



Fig 5: Temporary taken from the matrix.



**Fig 3:** Removal of the undercuts in the area of the crown margin in the preliminary impression.



Fig 6: Careful finishing and smoothening of the margin.



Fig 7A and 7b: The smear layer on the surface is easily wiped off with ethanol, leading to a glossy appearance.



Fig 8: Cementation of the provisional crown with temporary cement.



Fig 9: Temporary in place.

## Case 2

In implant cases or other situations without pre-existing tooth anatomy, the matrix is usually manufactured in the dental laboratory. Here, the tooth anatomy is built up on a model and the matrix is produced e.g. by thermoforming. The subsequent procedure steps are the same as for the chairside procedure.



**Fig 1:** Edentulous maxilla with four implants in place. Lab-produced.



Fig 2: Lab-produced matrix.



Fig 3: Matrix filled with bis-acrylic material (3M<sup>™</sup> Protemp<sup>™</sup> Plus Temporisation Material), placed in the patient's mouth.



**Fig 4:** Basal view of the implant-based temporary with smooth surfaces and rounded edges.

## Alternatives

For temporary restoration of single teeth or implants in the posterior region, the use of a pre-formed composite crown 3M<sup>™</sup> Protemp<sup>™</sup> Crown Temporisation Material is a suitable option. The crown is malleable and available in a number of different sizes. Following size measurement and selection of the appropriate crown, it is trimmed at the gingival margin, adapted to the oral environment, light cured and polished. For placement, any temporary cement may be used.

For all situations requiring a thorough clinical test drive (as is the case for most complex rehabilitations), PMMA temporaries produced in the laboratory using CAD/CAM technology are recommended. As these temporaries are designed with the same software used for production of the final restorations, modifications performed during the test drive are easily transferred to the next steps in the procedure without any loss of information. The high strength and aesthetic appearance of the materials used allows for a long wear time and a realistic forecast of the final treatment outcome.

## **Tips and tricks**

Simplifying and standardising material selection can help to ensure temporaries are made with consistent and sufficient quality. Important factors to be taken into account for material selection are the substrate (teeth or implants), the type of restoration (crown, veneer, or bridge), the number of units to be restored, and the duration of the temporisation period.

#### Conclusion

The quality of the temporary has a huge impact on gingival health and the long-term success of the final restoration. Conditioning the gingival tissues in an optimal way, it has the potential to make life easier during impression taking and cementation, where a dry and clean working field is needed. In addition, temporisation may be used as a tool for evaluation of functional and aesthetic aspects – making it possible to create realistic expectations and thus provide the conditions needed for happy patients. By choosing the right material and technique, it is possible to accomplish these tasks reliably and with reduced effort.



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## Clinical Case: Glass-ceramic tabletop restoration using 3M<sup>™</sup> RelyX<sup>™</sup> Universal Resin Cement

Using 3M<sup>™</sup> Scotchbond<sup>™</sup> Universal Plus Adhesive, 3M<sup>™</sup> Filtek<sup>™</sup> Bulk Fill Flowable Restorative, and 3M<sup>™</sup> RelyX<sup>™</sup> Universal Resin Cement.

#### About the case

A 54-year male with a history of bruxism presented with cracks in tooth 16. The tooth tested vital. After removal of the existing amalgam restoration, extensive radiating crack lines were found propagating from mesial to distal and buccal to palatal. Due to his bruxism and history of cracked teeth that needed endodontic treatment, it was decided to protect the tooth from further cracks with a cusp-capping tabletop restoration. Cusps were reduced to the minimum required thickness (1.5mm) of the indirect material. Dentine was sealed with 3M<sup>™</sup> Scotchbond<sup>™</sup> Universal Plus Adhesive and the cavity was lined with 3M<sup>™</sup> Filtek<sup>™</sup> Bulk Fill Flowable. A lithium disilicate (IPS e.max<sup>®</sup>) restoration was fabricated with CEREC<sup>®</sup>, stained and glazed. Bonding was performed with 3M<sup>™</sup> RelyX<sup>™</sup> Universal Resin Cement using a selective enamel etch protocol and 3M<sup>™</sup> Scotchbond<sup>™</sup> Universal Plus Adhesive.





### About the author



Sydney Cosmetic Dentist, Dr Andrew See is a highly trained cosmetic and implant dentist with over 18 years of experience in the dental profession. His practice is focused primarily on aesthetic rehabilitation, implantology and hard and soft tissue augmentation.

He completed his Bachelor of Dental Surgery with Honours from the University of Sydney in 2003 and then went on to complete a Postgraduate Diploma in Dental Implantology and a Masters Degree with Distinction in Aesthetic Dentistry through the prestigious King's College London.

Dr See has completed his Fellowship by primary and secondary examination for The Royal Australasian College of Dental Surgeons (FRACDS) achieving numerous commendations for outstanding performance. He is also a Fellow of the International Congress of Oral Implantologists.

His passion and skill in photography has been recognised when he was awarded 2020 Top 50 Top Emerging Photographers and he was awarded in 2019 Top 100 in the amazing Open/Illustrative category in the Australian Photography Awards.



**Fig 1:** Removal of old amalgam revealed cracks running under buccal and distobuccal cusps.



Fig 2: Tabletop preparation with minimum required occlusal reduction of 1.5mm.



Fig 3: Dentine sealed with 3M<sup>™</sup> Scotchbond<sup>™</sup> Universal Plus Adhesive; cavity lined with 3M<sup>™</sup> Filtek<sup>™</sup> Bulk Fill Flowable Restorative.



**Fig 4:** Composite was sandblasted (50 µm alumina) and enamel was etched followed by application of 3M<sup>™</sup> Scotchbond<sup>™</sup> Universal Plus Adhesive.



Fig 5: Lithium disilicate restoration, HF etched and silanised with 3M<sup>™</sup> Scotchbond<sup>™</sup> Universal Plus Adhesive



Fig 6: Seating of tabletop on 3M<sup>™</sup> RelyX<sup>™</sup> Universal Resin Cement layer applied to the preparation.



**Fig 7:** Restoration in place, excess cement was removed right away with floss and instruments.



**Fig 8:** Finished margin after final light cure through glycerin gel.



Fig 9: Final restoration.

#### Conclusion

Cusps were reduced by 1.5mm for the minimum thickness of the indirect material. This type of preparation utilises the adhesive bonding to enamel and results in a minimally invasive preparation and protects the tooth from further crack propagation.



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