

3M™ Filtek™ Supreme
Flowable Restorative

Technical Data Sheet



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Introduction

Our global leadership in restorative dentistry is defined by more than 50 years of innovation.

The most notable achievement was the creation of a unique new category of dental material in 2002—the nanocomposite.

The first flowable nanocomposite, 3M™ Filtek™ Supreme Plus Flowable Restorative, was launched in 2005, incorporating the filler technology of 3M™ Filtek™ Supreme Universal Restorative. In 2010, 3M™ Filtek™ Supreme Ultra Flowable Restorative was created, improving the former Filtek Supreme Plus Flowable restorative by combining the strength and esthetics of the enhanced 3M™ Filtek™ Supreme Ultra Universal paste with the “flow-on-demand” handling of Filtek Supreme Plus Flowable Restorative.

In 2020, we introduced a new ergonomic syringe designed to reduce the bubbles and material run-on commonly associated with flowable composite extrusion. In 2022, we introduced expanded indications for Filtek Supreme Flowable Restorative.

Flowable composites have been popular for years due to their low viscosity, excellent handling, and adaptation to cavity walls. To better support the needs of the modern dental practice, Filtek Supreme Flowable Restorative can now be used for all classes of direct restorations.

Features

- Expanded indications (classes I-V)*
- Bubble and run on reduction
- Ergonomic syringe design
- Bendable cannula (20 gauge)
- Safe to warm** and injection mold

* Please refer to Instructions for Use. Indications may vary by geographical region.

** Warm capsules up to 70°C (158°F) for up to 1 hour.
Warm syringes up to 70°C (158°F) for up to 1 hour, up to 25 times.

2002

3M™ Filtek™ Supreme Restorative

2005

3M™ Filtek™ Supreme Plus Flowable Restorative

2010

3M™ Filtek™ Supreme Ultra Flowable Restorative

2020

3M™ Filtek™ Supreme Flowable Restorative
Updated ergonomic syringe

2022











3M™ Filtek™ Supreme Flowable Restorative
Expanded Indications Class I V

Product Description

3M™ Filtek™ Supreme Flowable Restorative is a low viscosity, visible light activated, radiopaque, flowable nanocomposite. The restorative is packaged in syringes and capsules. It is available in a variety of tooth-colored shades. The shades offered with Filtek Supreme Flowable Restorative were designed to coordinate with shades offered with 3M™ Filtek™ Supreme Ultra Universal Restorative and 3M™ Filtek™ Universal Restorative.

Indications for Use*

3M™ Filtek™ Supreme Flowable Restorative
(Incremental up to 2 mm)

 Class I	 Class II	 Class III	 Class IV	 Class V
 Base	 Liner	 Repair of Indirect (small defects)	 Repair¹	 Pit & Fissure Sealant

1. Repair of resin and acrylic temporary materials

Composition

Filtek Supreme Flowable Restorative contains Procrilat, BisGMA, and TEGDMA resins. The fillers are a combination of a non-agglomerated/non-aggregated surface modified 20 nm silica filler, a non-agglomerated/non-aggregated surface modified 75 nm silica filler, a surface modified aggregated zirconia/silica cluster filler (comprised of 20 nm silica and 4 to 11 nm zirconia particles) and ytterbium trifluoride filler with a range of particle sizes from 0.1 to 5.0 µm. The aggregate has an average cluster particle size of 0.6 to 10 µm. The total inorganic filler loading is approximately 65% by weight (46% by volume).

*Please refer to Instructions for Use. Indications may vary by geographical region.

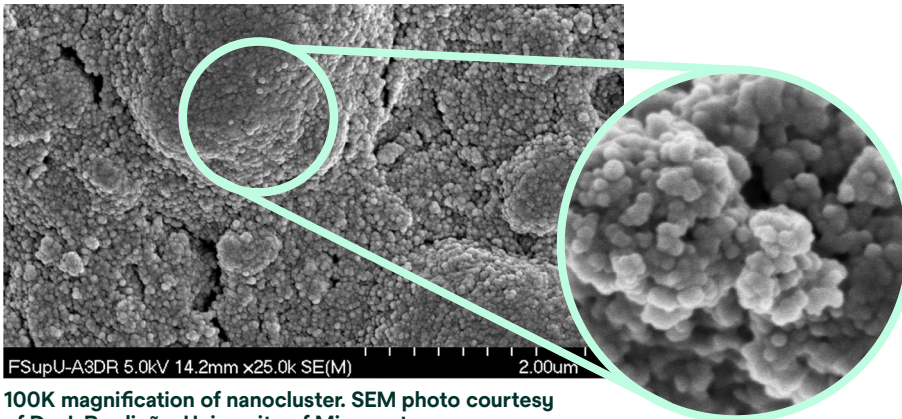
Background Information

Fillers/Nanotechnology

Solventum is the only company in the dental industry that has patented TRUE nanofiller technology, which means we have the only **TRUE** nanocomposites on the market.

Unlike microhybrids and nanohybrids, which contain particles of different sizes and shapes and are the result of a grinding process, the nanoparticles in 3M™ Filtek™ Supreme Flowable Restorative (a **TRUE** nanocomposite) are uniquely formed to the same size and shape from sub-100nm particles.

These nanoparticles can be fused into nanoclusters, protecting well against wear. However, the spherical nanoparticles wear slowly, layer by layer, instead of plucking out as a whole particle. This leaves a smoother, more wear-resistant surface, and enables a higher gloss after toothbrush abrasion. Additionally, the nanoclusters are around 1–3 µm in size, which allows a high filler loading and results in excellent physical and handling properties.



100K magnification of nanocluster. SEM photo courtesy of Dr. J. Perdigão, University of Minnesota.

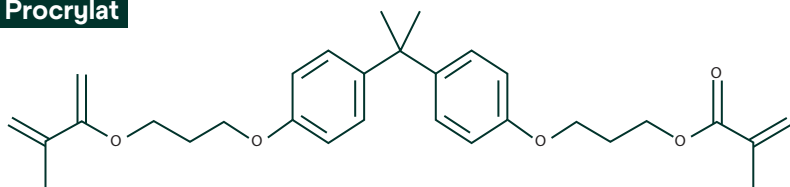
TRUE nanotechnology gives Filtek Supreme Flowable Restorative excellent wear resistance and polish retention, a key differentiator between it and competitive nanohybrids, microhybrids, and microfills.

Resin System

One of the key features of flowable restoratives is their flow properties. The ability to wet the surface of cavities quickly and with minimal instrumentation defines this filling material category. These materials are used as liners, as well as actual filling materials for small restorations. Besides flowable handling, these materials must possess adequate physical properties, such as strength and wear resistance, to ensure clinical success in a variety of indications.

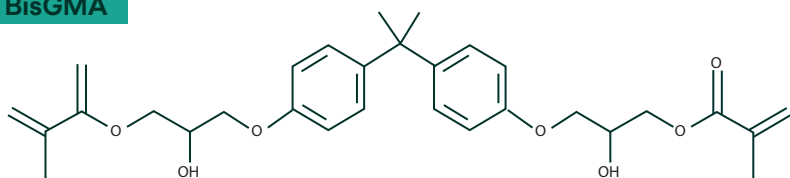
The challenge to creating these materials is achieving a clinically acceptable balance of properties. Frequently modifications that produce a flowable restorative (lower viscosity) adversely affect strength, wear resistance and shrinkage.

Procrylat



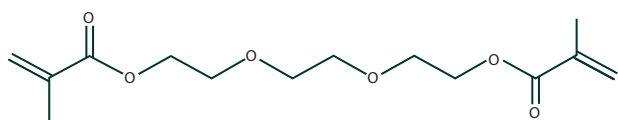
High molecular weight
hydrophobic and
low viscosity main
monomer.

BisGMA



High molecular weight
hydrophilic and high
viscosity monomer.

TEGDMA



Low molecular weight,
low viscosity monomer.

Table shows monomers used in 3M™ Filtek™ Supreme Flowable Restorative.

One of the product development goals was to reduce the amount of TEGDMA, a low molecular weight, high shrinkage monomer. Due to its low viscosity, TEGDMA is often used to lower the viscosity of high viscosity resin blends. Solventum designed a hydroxyl-group free BisGMA called Procrylat. This monomer offers a high molecular weight and a low viscosity due to the lack of hydroxyl groups. This allows for a reduction in the amount of the high shrinkage TEGDMA without increasing the resin viscosity. A high filler load with excellent flow properties with mainly larger, lower shrinkage monomers has been achieved.

The resin is well balanced between hydrophilicity and hydrophobicity. The hydrophilic BisGMA and TEGDMA enable a good wetting of the more hydrophilic adhesive surface, which is important for good adaptation. On the other hand, the hydrophobic nature of Procrylat is regarded as advantageous for long term stability of the cured material. This can be seen with the high flexural fatigue limit of Filtek Supreme Flowable, which is still comparable to or better than some widely used Universal composites (IADR publication: Flexural Fatigue Limit of Aged Composite Specimens, Dede et al, Madrid 2019).

Delivery

Virtually No Bubbles or Run-on

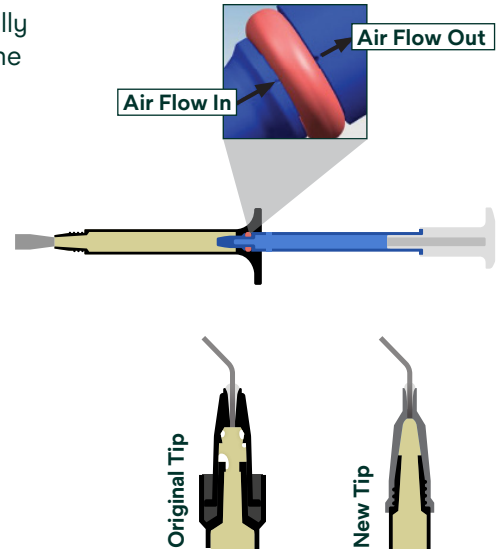
3M™ Filtek™ Supreme Flowable Restorative Syringe was designed to have virtually no bubbles or material “run-on” during dispensing for better control thanks to the inner design, which works in two ways:

1 Air Entrapment Reduction System: Syringe Design

Due to a specially designed channel in the piston, air can escape from the syringe during the filling process at Solventum production facilities. This prevents air from becoming trapped in the syringe, which can lead to bubbles and run-on.

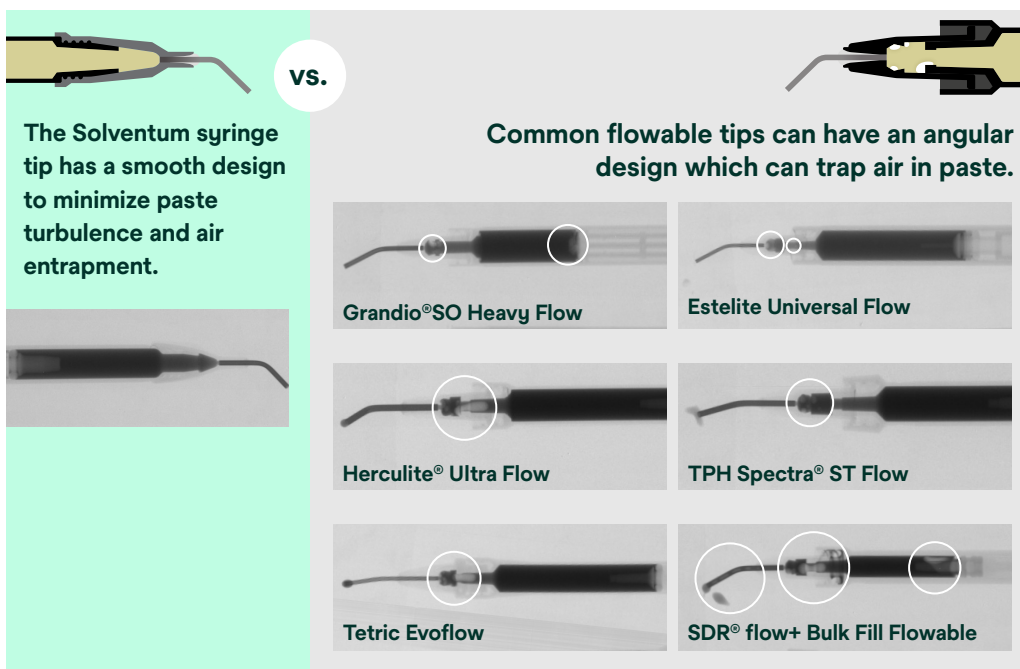
2 Air Entrapment Reduction System: Tip Design

Due to the smooth, tapered, inner-wall of the tip, which corresponds to the tapered angle of the syringe, material is able to flow through the new tip design without trapping air.



Comparison to competitor syringes

Bubbles can also be introduced while dispensing flowable composites. Filtek Supreme Flowable Restorative Syringe was designed to avoid this with a smooth design that minimizes paste turbulence and air entrapment.



Source: Solventum Internal Data. Grandio®SO Heavy Flow Lot # 1846460; TPH Spectra® Flow Lot # 1910000745; Estelite Universal Flow Lot # 012E99; Tetric Evoflow Lot # Y39462; Herculite™ Ultra Flow Lot # 7331880; SDR® flow + Bulk Fill Flowable Lot # 1603291; 3M™ Filtek™ Supreme Flowable Restorative Lot # NA63058.

Ergonomic Design

Easy to hold and extrude

A triangular finger plate and plunger make it quick and easy to personalize your grip. The “No Roll” design with triangular finger plate ensures the syringe stays put when placed on a flat surface.

Reduced hand pressure offers increased comfort

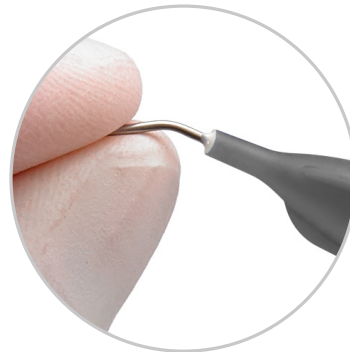
With the increased surface area of the plunger the required pressure on the hand/thumb when extruding the paste can be reduced up to 58%.¹



Cannula

Easy-to-bend without kinking for better access

The 20-gauge bendable cannula is designed to improve access to hard-to-reach preparations and allow for precise material placement. And when bent, the tip resists kinking to prevent material delivery interruptions. The inner cannula design is 20 gauge and can be exchanged with the 3M™ Filtek™ Bulk Fill Flowable Tips (19 gauge).²



Easy-to-bend cannula for precise placement

Material Volume Indicator

No more guessing

The blue syringe barrel indicates the remaining material volume. When your syringe is empty, only the white plunger shows.



Full Syringe



Half Full



Empty

1. Source: Solventum internal data

2. Resulting in slightly lower extrusion force due to its larger inner diameter.

Material Properties

Shades/Shade Match

3M™ Filtek™ Supreme Flowable Restorative shades match the VITAPAN® Classical Shade Guide and correspond to shades of 3M™ Filtek™ Supreme Ultra Universal Restorative and 3M™ Filtek™ Universal Restorative. The opacity of the shades corresponds to the Body shade opacity, except for the Opaque shade, which matches the opacity of the Dentin shades in Filtek Supreme Ultra Universal Restorative.

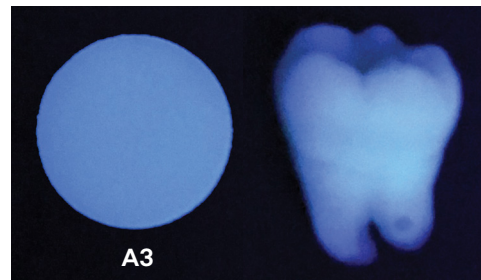
- A1, A2, A3, A3.5, A4, Opaque A3
- B1, B2, B3,
- D2,
- Extra White, White



Fluorescence

One additional esthetic property of natural dentition is fluorescence.

This property contributes to the vitality and lifelike appearance of composites. Fluorescence in teeth occurs when light energy is absorbed and emitted at a longer wavelength, giving the tooth structure a blue-white appearance. Filtek Supreme Flowable Restorative has fluorescent pigments added to help match natural dentition.



Fluorescence determined with light sources simulating natural UV light.

Source: Solventum internal data.

Flow on Demand

When subjected to shear forces during dispensing, the viscosity of Filtek Supreme Flowable Restorative decreases, lowering the extrusion force. The addition of a dimethacrylate polymer modifies the rheology of Filtek Supreme Flowable Restorative so it doesn't run when subjected to gravitational forces.



Flowable composite stays as placed on the mixing pad.

Technical Data

Property	Unit of Measure	Flowable Composite Average*	3M™ Filtek™ Supreme Flowable Restorative
Cusp Deflection	μm	13.4	13.3
Fracture Toughness	MPa m ^{1/2}	1.5	1.4
Polish Retention	Gloss%	43.1	66
Radiopacity	mmAl	2.8	2.1

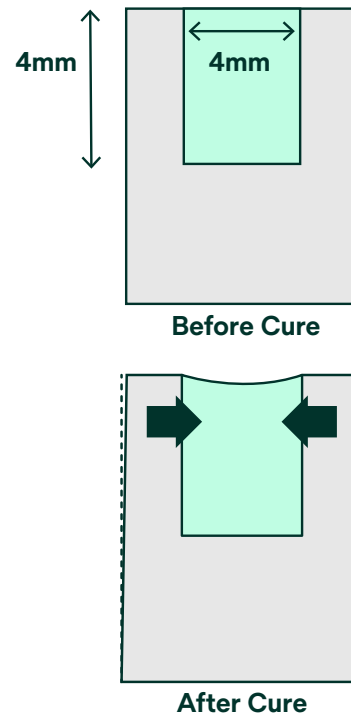
Solventum internal data.

*Ivoclar Tetric EvoFlow®, Dentsply TPH Spectra® Flow, Kuraray Clearfil Majesty™ Flow, Voco Grandio®SO Heavy Flow, GC G-aenial™ Universal Flo, GC G-aenial™ Universal Injectable.

Test Methods

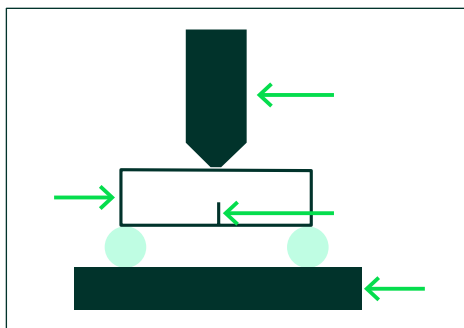
Cusp Deflection (shrinkage-stress) test method

Shrinkage can cause stress in the tooth, the bonding layer, and within the composite itself. Stress can be a result of the combination of material shrinkage and the material's elastic modulus. For materials with similar shrinkage, the material with the higher modulus (or stiffness) will usually produce greater stress. Conversely, for materials with similar moduli, the material that exhibits the highest shrinkage will produce greater stress. Cusp deflection is a test method that was designed to provide a relative estimate of polymerization shrinkage stress resulting from placing and curing a dental composite in a 4 x 4 mm, open-ended cavity. The cavity dimension roughly simulates a large cavity preparation (e.g., mesial-occlusal-distal (MOD) preparation). The surface of the aluminum cavity was sandblasted and silane-treated, and a dental adhesive was applied. The composite was then placed in the aluminum cavity in two separately cured increments of 2 mm. A linear variable displacement transducer was used to measure the displacement of the aluminum cavity wall due to polymerization shrinkage stress. Aluminum was selected as the block material because it has a modulus similar to human enamel. A similar cusp deflection method using an aluminum block has been described in the literature.¹



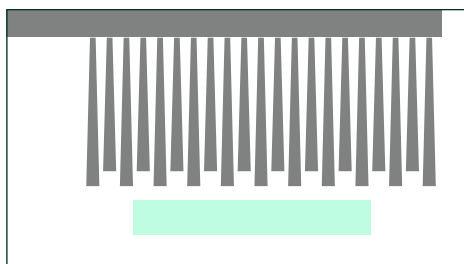
Fracture Toughness (strength)

A material's fracture toughness is related to the energy required to propagate a crack. In this test, a short bar of material is cured. A notch is then cut into it. The bar is placed on a fixture that supports either end, and an anvil is positioned above the notch. The anvil presses down until the bar breaks. Higher fracture toughness values mean the material is more resistant to fracturing and have been correlated with better resistance to fracture in clinical use.²



Polish Retention (abrasion resistance)

When composites undergo abrasion (toothbrushing, chewing, etc.), the resin around the particles is worn. During this wear, the protruding filler particles (bumps) are exposed. Eventually, after enough wear and time, the entire filler particle falls away from the surface of the composite, resulting in divots within the material's surface. When a material contains many of these bumps and divots, it creates an uneven, rough surface, which results in the loss of reflectivity (loss of gloss) on the composite surface.



To test this phenomenon, composite materials were shaped into tiles and thoroughly cured. The surfaces were polished while wet using a Buehler variable-speed grinder-polisher to remove the air-inhibited layer and to ensure a uniform surface. They were stored in water at 37°C (98.6°F) for 24 hours. Gloss was measured at 60 degrees. The samples were brushed with toothpaste and a toothbrush that was mounted on an automatic toothbrush machine. Gloss measurements were taken after every 1,500 cycles until the completion of 6,000 toothbrush strokes.

Curing Protocol

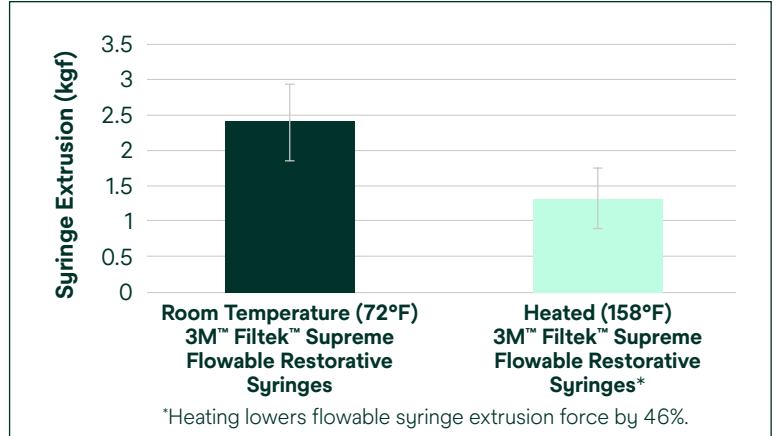
3M™ Filtek™ Supreme Flowable Restorative	Increment Depth	All halogen lights (with output 550 – 1000 mW/cm ²)	3M™ Elipar™ LED Lights (with output 1000 – 2000 mW/cm ²)
Opaque A3 Shade	1.5 mm	40 sec.	20 sec.
All other Shades	2.0 mm	20 sec.	10 sec.

2. N. Ilie, T. J. Hilton, S. D. Heintze, R. Hickel, D. C. Watts, N. Silikas, J. W. Stansbury, M. Cadenaro, and J. L. Ferracane. Academy of Dental Materials guidance—Resin composites: Part I—Mechanical properties. Dental Materials 33 (8):880–894, 2017.

Warming

Reasons to warm

- Warmed composites have a lower viscosity for easier handling
- Warming improves adaptation of Filtek composite to tooth structure¹
- Warming lowers extrusion force²



The science of safety

We have performed rigorous testing to ensure the safety of pre-warmed 3M™ Filtek™ Supreme Flowable Restorative for both clinicians and patients. Toxicology testing has been completed for all recommended 3M products. Extensive literature search and Solventum pulp temperature testing confirm minimal heat transfer to the pulp.

Solventum is the first to offer a dental composite cleared by the FDA for warming.³



Biocompatible
according to
ISO-10993-1:2018
based on a review
by a board-certified
toxicologist.



Minimal heat transfer
to the pulp.^{2,5}

Unchanged physical properties⁴

- Diametral tensile strength
- Flexural strength
- Depth of cure
- Flexural modulus
- Color stability

1. Solventum internal data.

2. When warmed according to our IFU: Capsules up to 70°C (158°F) for up to 1 hour. Syringes up to 70°C (158°F) for up to 1 hour, up to 25 times.

3. 3M™ Filtek™ Universal Restorative capsule.

4. Solventum internal data.

5. Daronch M, Rueggeberg FA, De Goes MF, Giudici R. Polymerization kinetics of pre-heated composite. J Dent Res. 2006 Jan;85(1):38–43.

Tips for Success

You can safely warm 3M™ Filtek™ Supreme Flowable Restoratives. Follow these general guidelines and refer to the instructions for use for more information.

DO



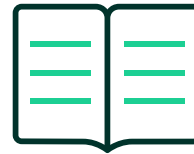
DO heat flowable syringes to up to 70°C (158°F) for up to 1 hour, up to 25 times.



DO heat capsules to 70°C (158°F) for up to 1 hour.



DO remove your composite from the heater if it won't be used immediately.



DO consult the Instructions for Use for more information.

DON'T



Do **NOT** use heat from a light bulb, microwave, mug warmer or other unapproved heating devices. Only approved devices have been tested for safety and efficacy when warming select Filtek composites. Consult the Instructions for Use for more information.

Clinical Cases

Repair of Marginal Enamel Chipping



Before



After



About the Case

A ten-year-old patient chipped his right central incisor while playing with the family cat. The case was treated during an emergency visit.

Challenge

When a child is involved, and only a small repair is needed, it is important to have a restorative delivery system that is fast, easy to use, and dispenses a controlled volume of material.

While flowable composites provide many desirable features, **the materials themselves often contain air bubbles**. If these bubbles go undetected, and the composite is cured, **a time-consuming repair may be needed** to achieve an esthetic and color stable final restoration.

Outcome

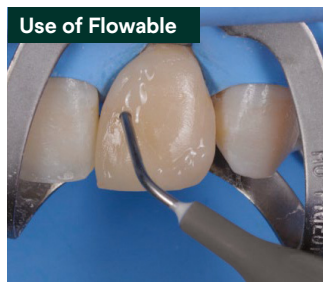
In a 10-minute procedure it was possible to **esthetically integrate the 3M™ Filtek™ Supreme Flowable Restorative** into the patient's natural tooth structure making this an effective and efficient treatment option.

Photos courtesy of Dr. Walter Devoto

Stabilizing Complex Cases with Single Shade Composites



Before



Use of Flowable



After

About the Case

The patient was unhappy with the results of previous orthodontic and restorative treatments and expressed a desire for a more aesthetic outcome. A diagnostic and aesthetic assessment were the first stages in the treatment of this complex case.

Challenge

Small defects are more easily corrected with flowable composite (in this case 3M™ Filtek™ Supreme Flowable Restorative, Shade A2). They are more easily corrected with flowable composite, in this case 3M™ Filtek™ Supreme Flowable Composite shade A2.

Outcome

The single shade composite strategy using the identical shade match of 3M™ Filtek™ Supreme Flowable Restorative in combination with 3M™ Filtek™ Universal Restorative enables the clinician **to focus on anatomical shape and finishing and polishing details** resulting in a very aesthetic final restoration.

Photos courtesy of Dr. Jordi Manauta



Class V Restoration Esthetics



Before



Flowable Placement
3M™ Filtek™ Supreme Flowable Restorative offers a smooth transition from material to tooth for esthetic restorations.



After



Photos courtesy of Dr. Gunnar Reich, Munich, Germany.

Liner Application



Before
Composites requiring replacement due to marginal staining and secondary decay.



Liner Application
3M™ Filtek™ Supreme Flowable Restorative, Shade A3, was used as a liner for easy adaptation and marginal seal.



After
Dentin replaced with 3M™ Filtek™ Supreme Ultra Universal Restorative, Shade A3, and light cured. Enamel replaced with 3M™ Filtek™ Supreme Ultra Universal Restorative, shade A3, and light cured. Stain applied to fissures.

Outcome

3M™ Filtek™ Supreme Flowable Restorative adapts easily and seals the margin.

Photos courtesy of Dr. Giuseppe Chiodera, Brescia, Italy.

Photos courtesy of Dr. Giuseppe Chiodera, Brescia, Italy.





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