Heraeus

Venus®
Step by Step Guide

Chapter 4
Light-Polymerisation

Venus®
The new aesthetics.

Contents

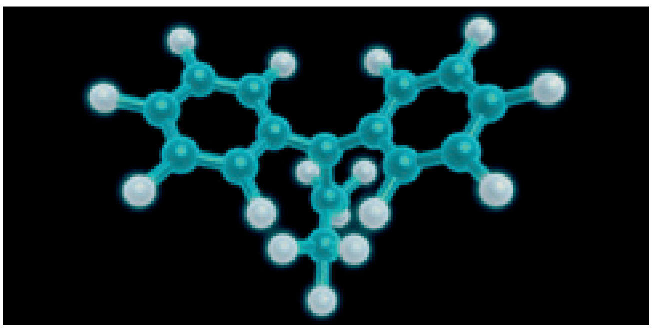
Basic structure of composites

The basic structure of composites consists mainly of an organic resin matrix (normally monomers, e.g. BisGMA, and possibly TEGDMA and UDMA), in which inorganic filler particles (porcelain, glass, etc.) are embedded to enhance the mechanical properties. Added to these main components are pigments for attaining different shades and photoinitiators (normally a mixture of camphorquinone, TPO and PPD).

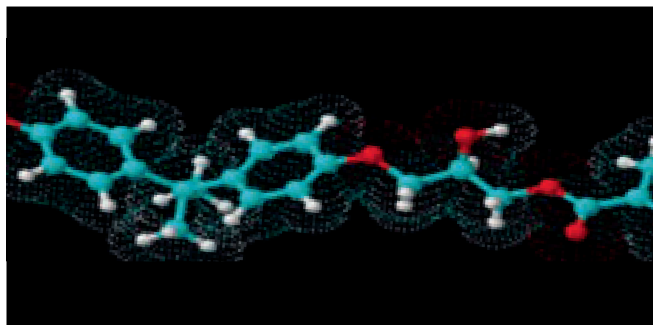
During light curing these photoinitiators are excited according to their light frequency (the most important is camphorquinone with a frequency of 468 nm); the photoinitiators then activate tertiary amines and convert them into free radicals. Each free radical then activates approx. 50 monomers, triggering a chain reaction. Initially a long polymer is formed and its three-dimensional structure is then stabilised by cross-linking.

In this way, polymerisation forms a chain of monomer molecules with the aid of free radicals. Free radicals break down the double bonds in the monomer molecules and convert them into covalent bonds.

The number of initiators that a light curing lamp can excite depends on the power of the lamp and is directly proportional to its light output and the thickness of composite layer to be polymerised.

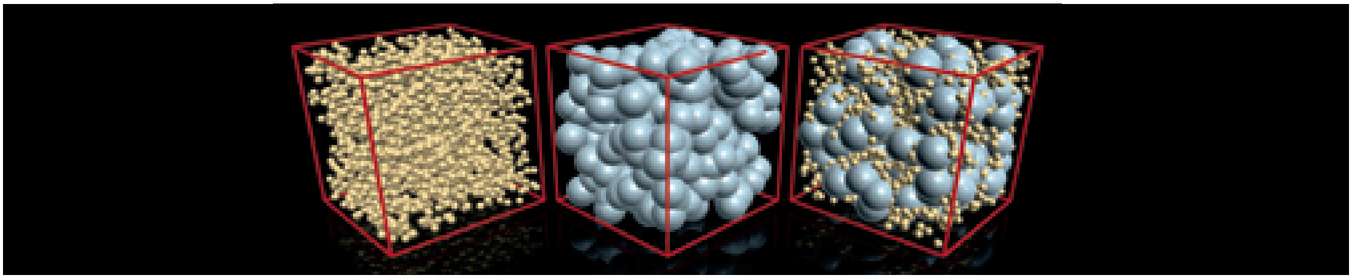


BisGMA monomers before polymerisation



BisGMA polymers after polymerisation

Classification of composites



Microhybrid composites and nano-composites: the smaller particle size of the fillers makes it possible to increase the percentage of fillers in the composite

Composites can be classified according to their composition:

Microfilled composites
with particles in the nanometer range (0.02 – 0.07 µm).

Microfilled composites
with a particle size greater than 1 µm.

Hybrid composites
with micro- and macro-particles.

Microhybrid composites
with particles of varying size, though less than 1µm.

Nanofilled composites
with particles in the nanometer range, which are partly integrated in the pre-polymerised complex and then embedded again in the composite.

Microfilled composites are easy to polish and highly aesthetic, but do not have sufficient strength.

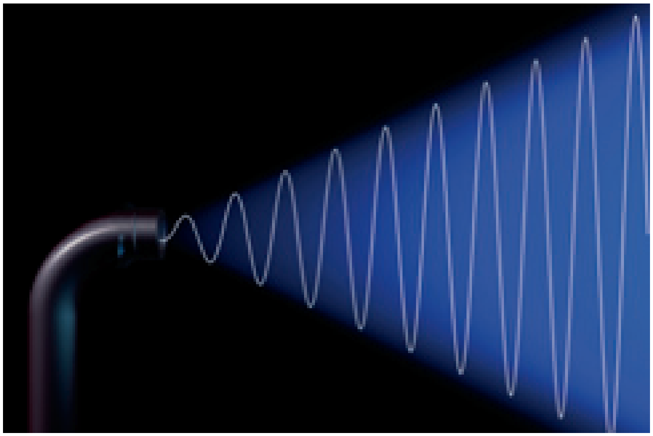
Macrofilled composites are difficult to polish and less aesthetic, but have very high strength.

Hybrid composites combine elements of the above two types, but are difficult to prepare, as they can be very sticky.

Microhybrid composites have been regarded as the best composites for over ten years, as they produce excellent aesthetics as well as sufficiently high strength in all areas of the oral cavity.

Nanofilled composites provide easier handling, excellent aesthetics, outstanding physical properties and low polymerisation shrinkage.

Polymerisation reaction



The photoinitiators in the monomers are activated by the light energy produced by polymerisation lamps

As already explained, the monomers of the organic resin matrix are linked to form long polymers during polymerisation. This reaction is described as conversion. The optimal result would be to link all the monomers available, which would represent a 100 % conversion. This very rarely happens; a conversion of approx. 70 % is regarded as acceptable. Achieving this rate of conversion depends on the effective energy and the reaction time of the energy.

Calculation:
The energy required for polymerisation is the product of the radiated power and the duration of radiation; it must be 16 joules/cm^2 for each millimetre of composite thickness.

The following should be noted:

- 1 joule = 1000 mW x cm^2
- 16 joules (= 16000 mW per cm^2) are required to polymerise a composite layer 1 mm thick
- Conventional polymerisation lamps produce approx. 400 mW/cm^2

Consequently, a composite layer 2 mm thick requires 32 joules = 80 seconds x 400 mW/cm^2 = 40 seconds x 800 mW/cm^2.

It can be easily deduced from this, that the polymerisation time can be reduced by increasing the light power. Experience has shown, however, that using lamps with too high a power (more than 2000 mW/cm^2) produces only short polymer chains and therefore high intermolecular stress.

Polymerisation phases

Conversion of the monomers into polymers, which occurs in a matter of seconds, actually comprises three phases:

- **Pre-gel phase:** The effective energy initiates conversion during which free radicals are excited and released. In this transition state the monomers are gradually aligned so that the gaps between the individual monomers are reduced to a minimum.

- **Gel point:** When alignment of the monomers is complete, the material has reached the gel point at which further alignment of the monomers is no longer possible.

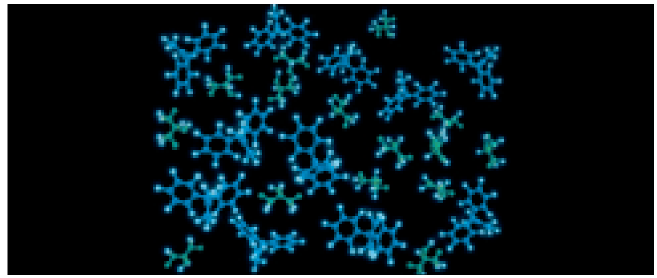
- **Post-gel phase:** The bonds between the monomers close to form the polymer. The chains can no longer slide and shrinkage of the composite caused by the chains linking leads to stress at the interface.

Ideally there should be a very long pre-gel phase with a composite to minimise stress in the composite filling.

Flow composites are based on this principle: they are highly flowable, as the filler content is low. This produces a high shrinkage, but at the same time gives the molecules greater freedom of movement, which reduces the stress.

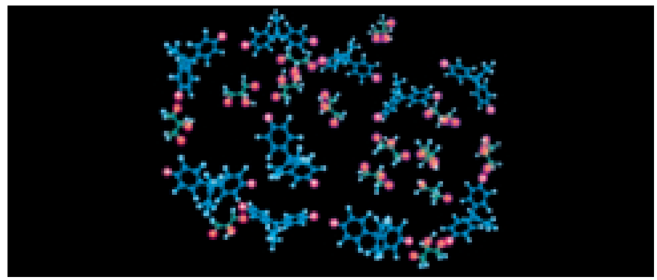
Another option for extending the pre-gel phase is to use polymerisation lamps with soft-start programmes. With these programmes the light energy emitted is initially low and then gradually increased so that the monomers can flow during polymerisation.

The monomers have virtually complete freedom of movement before the start of polymerisation.



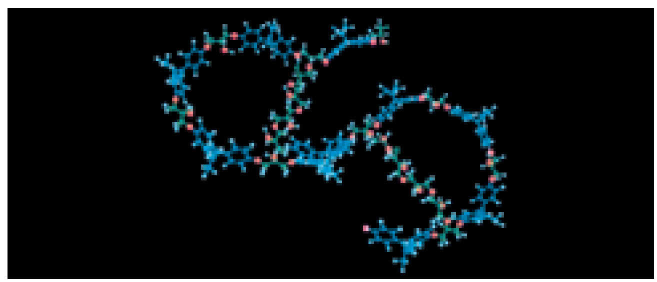
Pre-gel phase

The pre-gel phase begins with light activation, during which the light energy produces conversion, releasing free radicals. In this transition state the monomers are gradually aligned so that the gaps between the individual molecules are reduced to a minimum.



Gel point

When alignment is complete, the material has reached the gel point at which further alignment is no longer possible. This is followed by the post-gel phase, during which the bonds between the monomers close to form the polymer.



Post-gel phase

Factors influencing polymerisation

The following factors influence the polymerisation process:

- Wavelength of the light emitted from the lamp
- Power of the light source
- Distance between tip of the light guide and composite surface
- Type and amount of material to be polymerised
- Presence of inhibitors
- Inhibition because of air contact
- Influence of peroxides

Wavelength of the light emitted from the lamp

The main characteristic of a polymerisation lamp is the wavelength of the light radiation emitted, which can have a wide range (halogen lamps: 380–500 nm) or a narrow range (LED lamps and plasma arcs: 450–470 nm).

With halogen lamps the frequency is produced by a filter, which only lets through light rays of the required frequency. With LED lamps the wavelength depends on the LED selected.

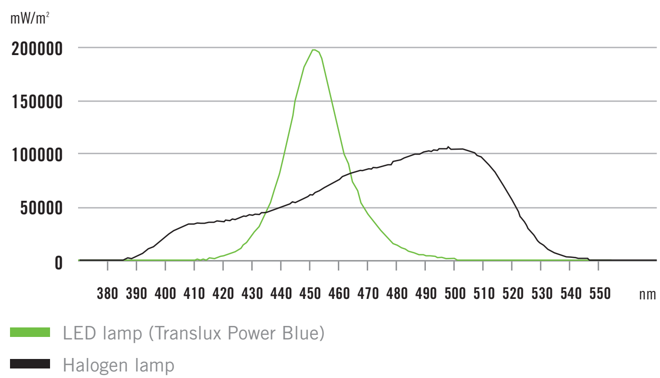
Power of the light source

The second characteristic of a polymerisation lamp is the light power, which indicates how many milliwatts per square centimetre (mW/cm²) the lamp produces. According to the rule explained before, 16 joules/cm² energy are required for a composite layer 1 mm thick, which is why programmable high-power lamps are the best option for ensuring correct polymerisation. Clinical experience has also shown that lamps with a light output of less than 400 mW/cm² are relatively ineffective, as there is not sufficient light energy to penetrate the composite layer fully. On the other hand, lamps with an output of over 2000 mW/cm² are so powerful that the pre-gel phase is "skipped", with the result that the material becomes too hard due to the large number of short polymer chains and high internal molecular stress is produced; this has a detrimental effect on the stability of the restoration.

Distance between tip of the light guide and composite surface

It should be noted that the energy applied to the composite is inversely proportional to the distance between the tip of the light guide and the surface to be polymerised. The light energy reduces by the power of two to the distance, which is why the space between the tip of the light guide and the composite should be kept to a minimum and the polymerisation time extended accordingly in deep cavities (e.g. approximal shoulders).

Distribution of wavelengths with different polymerisation lamps



Type and amount of material to be polymerised
As previously explained, composite materials can be differentiated according to their type as well as the size and amount of their filler particles: this greatly influences the ability of the light to penetrate deep layers and ensure uniform polymerisation of the material. In all cases the exposure parameters given by the manufacturer of the material should be adhered to.

It is important to take into consideration the type of material to be polymerised, as the exposure time for an opaque composite (dentine) is twice as long as for a semi-translucent composite (enamel) due to its lower translucency.

It is also important to take into consideration the amount of material to be polymerised with regard to the exposure time, as it makes a big difference whether a layer thickness of 1 mm or 2 mm is to be polymerised. As a safety measure, experts recommend always increasing the exposure time slightly to retard the effects of contraction and attain optimal polymerisation.

Presence of inhibitors
The presence of certain materials in the oral cavity such as eugenol (e.g. in temporary luting materials) or traces of solvents such as acetone or ethanol can inhibit polymerisation.

Inhibition because of air contact
As is generally known, there is a sticky film on the surface of the composite following polymerisation. This film, referred to as the disperse phase, should not be touched if composite is to be added, as it is required for bonding the two layers of composite. If an occlusal surface has been optimally contoured, the dentist may not like having to “clean off” or modify this film following polymerisation. To avoid this, the composite surface can be insulated, e.g. with a little glycerine, to prevent contact with the air and then polymerised.

Influence of peroxides
After bleaching treatment or the application of hydrogen peroxide to the tooth to be restored, a minimum of 15 days should be allowed before restoration treatment, as the material has penetrated the tooth structure and continues to release oxygen for a few days following treatment.

Polymerisation shrinkage

Due to its composition, composite materials shrink during polymerisation and impair the marginal integrity of the restoration

During the polymerisation process the molecules move towards each other to form a chain; this reduces the space between individual monomer molecules, which leads to shrinkage of the composite and stress. This stress can have various clinical effects:

- **Postoperative sensitivities:** There are various causes of postoperative sensitivities; contraction stress, which occurs particularly in the deeper areas of the restoration, is a possible cause. More precisely, contraction that occurs at the interface between composite, adhesive, and hybrid layer results in a crisis in the system and manifests itself mainly in the so-called pump effect, i.e. pain under masticatory loading.
- **Marginal gap:** Polymerisation shrinkage is particularly noticeable at weak structures, which in fillings are at the marginal areas. Preparation of the cavity margin is very important: for years dentists have been trained to bevel the margin in order to create enamel/composite junctions, which would allow any minor errors in shade to be more easily masked. Thin composite structures are, however, less able to withstand loading and can fracture or simply wear down. This defect can be seen by applying dyes, which penetrate between the tooth structure and composite. Marginal gaps are like an open invitation for infiltration.
- **Secondary caries:** Generally this is the result of marginal leakage, which has allowed bacteria to penetrate between tooth and restoration.

Mechanically, excessive polymerisation shrinkage can lead to fracture of a section of the filling or the entire filling. This can be an adhesive fracture (at the interface between the composite and tooth structure) or a cohesive fracture (within a single structure) or a mixed fracture.

Polymerisation shrinkage differs from material to material. Research is being focused on finding ways of drastically reducing polymerisation shrinkage. Materials are currently being tested that have a volumetric contraction of less than 1 %. The fact that conventional materials now in use, which have a shrinkage of approx. 2.7 % (e.g. Venus, Heraeus Kulzer), were inconceivable 8 to 9 years ago, justifies the optimistic view that shrinkage will soon become less of a problem.

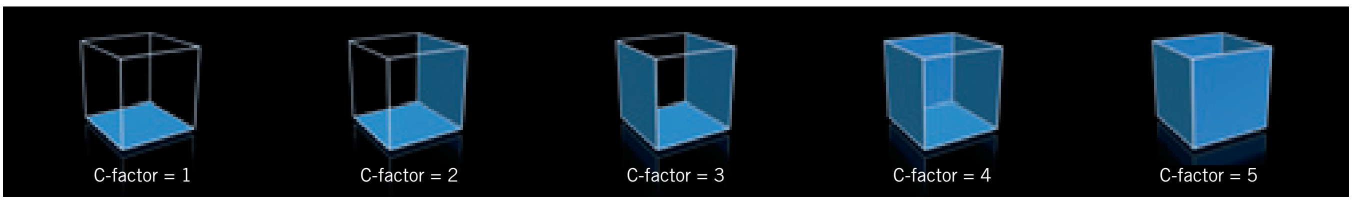
Up to now polymerisation shrinkage has been counteracted by reducing the resin content and increasing the proportion of inorganic filler with increasingly smaller particle sizes. It is now actually possible to manufacture nanoparticle-sized fillers (1×10^{-9}m), which can be used to produce composites with a filler content of 60% by vol. (80% by weight).

C-factor

It has already been explained how polymerisation functions and what influences the process. It was clear that shrinkage is one of the factors that has to be avoided or – more precisely – compensated for in some way.

In 1984 Davidson introduced the concept of the C-factor (configuration factor) or shrinkage factor, which he defined as the ratio between the exposed surfaces and adhesive surfaces of a filling: the greater the number of walls the greater the stress on the tooth. This means that a class I filling is much less favourable than a class IV filling.

An incremental build-up technique has to be used to counteract this problem. With this technique each composite layer is applied to the cavity in a maximum thickness of 2 mm and in the shape of a triangle to ensure that the number of walls at which shrinkage of the composite can occur is kept to a minimum. If a class I occlusal cavity is to be filled, the natural contour of the cusps and fissures are applied in sequence using this technique instead of "packing" the filling with a uniform layer 2 mm thick. With this technique an unfavourable cavity situation is slightly less of a problem, as only two/three walls are involved instead of five.



If the C-factor is increased, stresses increase at the interface between the tooth and restoration

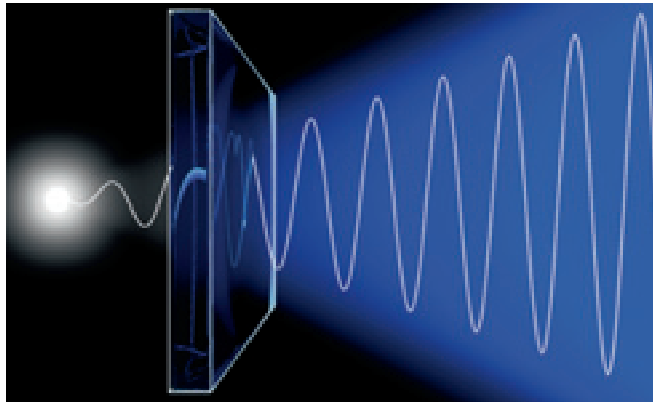
The incremental build-up technique helps to reduce shrinkage stresses at the interface by reducing the C-factor of each increment

Polymerisation lamps

With all polymerisation lamps – regardless of the system used – light is produced by a light source and emitted after passing through a filter or bundling system.

As already explained, camphorquinone (activated at a wavelength of 468 nm) is the most important, though not the only, polymerisation activator. Generally the activation range is between 400 nm and 500 nm (i.e. well below the infrared range, which would heat the teeth too much).

Generally the degree of conversion of a composite is inversely proportional to the square root of the light output of the polymerisation lamp.



With all polymerisation lamps – regardless of the system used – light is produced by a light source and emitted after passing through a filter or bundling system

There are a variety of polymerisation lamps with different properties:

Type of lamp	Output in mW/cm^2	Polymerisation range in nm	Peak value
Halogen	200–3000	380–500	Constant distribution with peaks of 470 nm
LED	250–1600	380–530	Concentrated only between 450 nm and 470 nm
Plasma	1400–2500	440–500	Very narrow distribution at approx. 470 nm
Mikro-Xenon	1300–1800	380–520	Irregular distribution between 400 nm and 500 nm

Halogen lamps

Halogen lamps, in which the light is produced by a current flowing through the tungsten filaments of a halogen bulb, are still the most commonly used lamps. Because the thermal range (infrared radiation) is filtered, only 1 % of the electrical energy can be converted to light energy (visible spectrum).

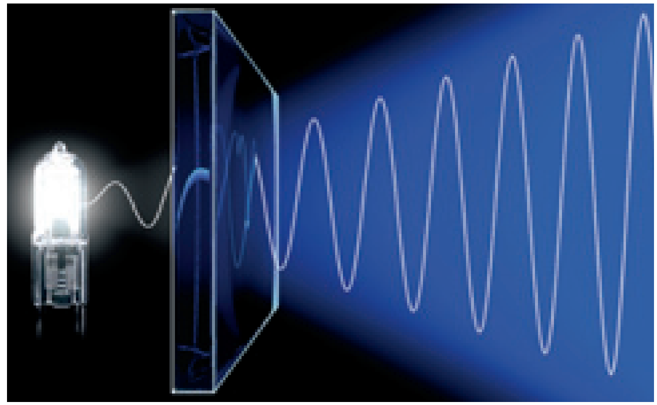
The latest generation of halogen lamps have an adjustable light intensity and are important instruments in ensuring correct polymerisation.

The average service life of a halogen bulb is approx. 50 hours and consequently its light output should be regularly checked with a radiometer.

Disadvantages of these lamps are the amount of energy they discharge and the operating noise due to ventilation (ventilator or coolant).

Advantages
Comprehensive scientific documentation, wide spectrum (average 380–500 nm), suitable for all photoinitiators.

Disadvantages
Large dimensions, constant maintenance required, a cooling system is required because the lamp heats up, loud operating noise.



The light from a halogen lamp is filtered to eliminate the infrared range that produces heat

LED lamps

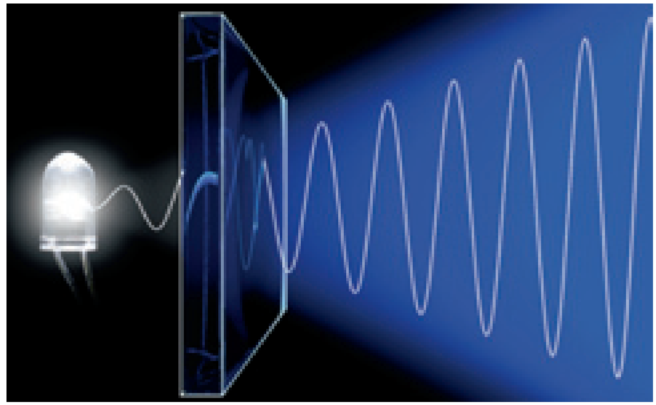
LED lamps consist of a solid semiconductor material (crystal), in which electrons are excited by passing a low-voltage electrical current through it. As the light ray is not produced by a thermal process but by exciting electrons inside a microscopic semiconductor crystal, the lamps can have a more compact design and can be operated with a battery, i.e. cordless, due to their low power consumption.

The light emitted has a concentrated spectrum, which normally corresponds to the absorption band of camphorquinone. An LED lamp with 400 mW/cm^2 is therefore more effective for polymerising camphorquinone-based materials than a halogen lamp with the same intensity.

As LED lamps are digital instruments, it is theoretically possible to design them so that they are fully programmable.

Advantages
Ergonomic, programmable, quiet, minimum or no maintenance required, no loss of performance, highly effective.

Disadvantages
Little scientific documentation, activation is restricted to camphorquinone.



Light emitted by an LED is only concentrated and not filtered

Translux Power Blue: LED polymerisation lamp from Heraeus Kulzer

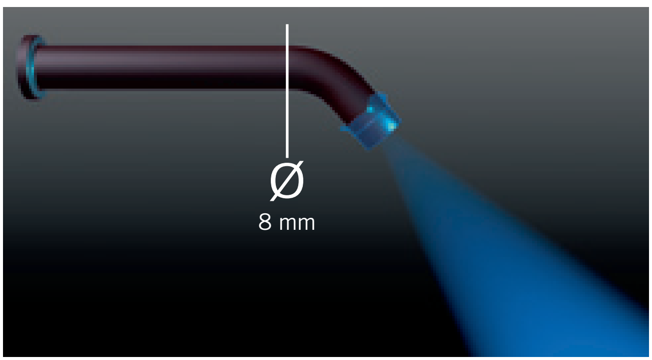
Light guides

The light guides of polymerisation lamps generally consist of light fibre bundles, which are retained in the handpiece in an integrated metal cylinder.

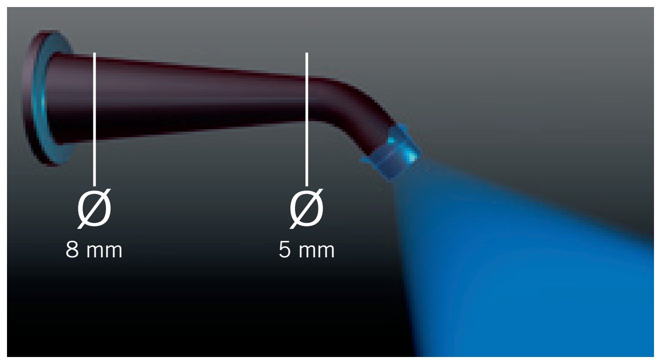
Standard light guides normally have an 8 mm input diameter and 8 mm output diameter, though a 13 mm input diameter and 8 mm output diameter is also possible.

Turbo light guides, on the other hand, have an input diameter of 13 mm or 8 mm and an output diameter of 5 mm. This means that the light fibres of turbo light guides have a larger diameter at the input and taper towards the output, which increases the fibre density per mm^2.

The greater the distance between the light guide and the surface to be polymerised, the more the light ray widens, reducing the light intensity. There is less dispersion with a standard light guide than a turbo-light guide, assuming that both light guides are at the same distance from the cavity. As a result the clinical indications are different: standard light guides are suitable for deep cavities, while turbo light guides perform better at short distances.



Standard light guide



Turbo light guide

The light radiation from standard light guides is more concentrated and therefore ensures better results in deep cavities. Turbo light guides, on the other hand, are ideal if there is only a short distance between the lamp and material to be polymerised.

Tips & Tricks

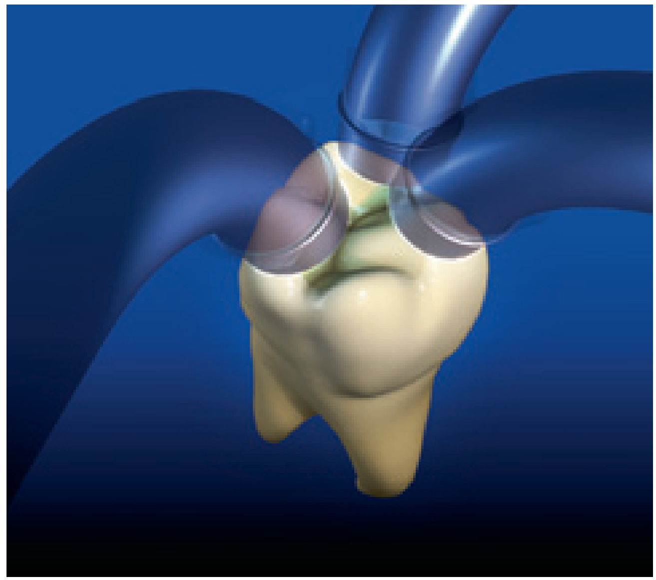
Soft-start technique
According to published data, a better marginal seal is obtained during polymerisation using the soft-start technique, as extending the pre-gel phase reduces the stress caused by polymerisation shrinkage.

Distance of the light guide
The performance of the light guide drops to 61 % at a distance of 2 mm; at a distance of 6 mm the performance drops even further to 23 %; polymerisation times therefore have to be in relation to the distance between the light guide and composite surface.

Polymerisation times
The following polymerisation times are recommended for each composite increment (in relation to lamps with 400 mW/cm^2):

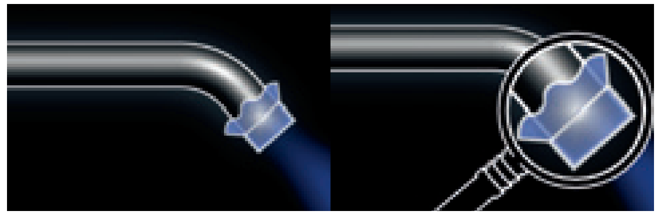
Polymerisation times	
Adhesive	20 sec.
Flow composite	20/40 sec. semi-translucent/opaque
Microhybrid composite	40 sec. (bottom layers, opaque dentine composites) 20 sec. (upper layers, semi-translucent enamel composites)

Adjacent areas of cavities with large surfaces should be polymerised consecutively. The shade and transparency of the composite affect polymerization times: the more opaque and darker the composite materials are, the longer they have to be polymerised. The composite manufacturer's instructions should be strictly adhered to.



Adjacent areas of large restorations should be polymerised several times

It is very important to clean the light guide of the lamp. An easy method of keeping the light guide clean is to cover the tip with some cling film, which is replaced for each patient to prevent cross infection.



The light guide is protected from damage and is always kept clean by covering it with cling film

The light intensity of the lamp should be regularly checked with a radiometer suitable for the type of lamp. If there is insufficient light output, the light guide should be checked to ensure it is not damaged and, in the case of halogen lamps, the bulb should be changed, if required.

A protective guard or protective glasses should be worn during radiation, as exposure to the rays can damage the retina.

Both the operator and patient should always wear eye protection to prevent damage to the cornea during photo-polymerisation.

Adhering to the correct exposure duration greatly reduces the risk of sensitisation after filling treatment.

Adhering to the prescribed polymerisation times guarantees the long-term durability of restorations

References

C. I. Davidson, A.J. Feilzer, Polymerization shrinkage and Polymerization shrinkage stress in polymer-based restoratives. J. of Dentistry 1997,6:285-291

Ruggeberg F.A. et al, Effect of Light Intensity and Exposure Duration on Cure of Resin Composite. Operative Dentistry 1994; 19:26-32

Berry T.G., Barghi N., Godwin J., Hunter K. Measurement of intensity of curing light units in dental officies J. Dent Res 161: Abst. 442, 1992

Translux® Power Blue® – Product outline

Indication

- Polymerisation of light-curing restoration materials such as composites, luting cements, adhesives, and fissure sealers.

Benefits

- Effortless operation due to the particularly light hand piece (weight only 143 g approx.)
- Easy to handle due to ergonomic hand piece with comfortable one-button control
- Freedom of movement due to the cordless hand piece and separate charging station
- Long-life battery and fast charging due to modern, processor controlled charging station
- Ventilator free, quiet operation
- Two exposure modes: Fast Mode (10 sec.) and Slow Rise (Soft Start, 20 sec.)
- Battery capacity 360 cycles, 10 sec. each
- High performance LED (up to 1,000 mW/cm^2)

Assortment

- **Translux Power Blue**
  LED polymerisation lamp including lithium battery, charging station, light guide (8mm diameter), glare shield, and power cable
  Art.no.: 66015574

- **Translux Power Blue Twin Pack**
  2 LED polymerisation lamps including lithium battery,
  1 charging base,
  2 light guides, 2 glare shields and 1 power cable
  Art.no.: 66017647

Replacements

- **Replacement light guide**
  1 light guide (8 mm diameter)
  Art.no.: 66016454

- **Replacement glare protector**
  1 glare protector
  Art.no.: 66016455

Venus® – Product outline

Venus is a light curing universal hybrid-composite based on fine particles for easy, fast and reliable creation of highly aesthetic restorations in anterior and posterior areas. Its colour spectrum comprises 27 shades, in which, apart from the standard shades (VITA), there are also special shades and very light shades (super bleach) available for treating bleached teeth. A 2Layer shade guide from original material makes selecting suitable shades particularly easy. Restorations with Venus are perfectly adapted to the surrounding hard tooth structure due to their "Color Adaptive Matrix". It is also convincing due to its optimal physical properties, nice handling and very high abrasion resistance.

Indications

- Direct restorations of classes I, II, III, IV and V
- Direct composite veneers
- Indirect restorations (inlays, veneers)
- Primary teeth restorations
- Aesthetic corrections, e.g. diastema closure
- Temporary splinting of teeth loosened by trauma or periodontal disease
- Core build-up
- Repair of ceramic and composite restorations

Benefits

- Stability and easy sculptability offer excellent handling
- "Color Adaptive Matrix" enables restorations to perfectly match the shade of the surrounding dental substance
- 2Layer Shade guide from original material facilitates the right shade selection
- Natural transparency facilitates the creation of lifelike restorations

Shade Guide

- Venus Shade Guide
  2Layer shade guide, manually layered from original material
  Shades: A1, A2, A3, A3,5, A4, B1, B2, B3, C2, C3, C4, D2, D3, HKA2.5, HKA5, SB1, SB2, T1, T2, T3
  Art.no.: 66008711

Syringe Assortment

- Venus Syringe Basic Kit
  1 x 4 g twist syringe each of shades A2, A3, HKA2.5, OA2, OA3 and T1,
  1 shade guide of original material, mixing pad, pictorial cards
  Art.no.: 66013214

PLT Assortment

- Venus PLT Basic Kit
  10 x 0.25 g PLT each of shades A2, A3 and HKA2.5, 5 x 0.25 g PLT each of OA2, OA3 and T1,
  1 shade guide of original material, mixing pad, pictorial cards
  Art.no.: 66013213

PLT Assortment

- Venus PLT Masters Kit
  (incl. GLUMA Desensitizer)
  All 27 shades, 10 x 0.25 g PLT each of shades A1, A2, A3, A3.5, B1, B2 and HKA2.5, 5 x 0.25 g PLT each of shades A4, B3, C2, C3, C4, D2, D3, HKA5, OA2, OA3, OA3.5, OB2, OC3, OD2, SB1, SB2, SBO, T1, T2 and T3,
  1 x 1.8g Venus flow syringe each of shades A2 and Baseliner,
  1 x 1 ml bottle GLUMA Desensitizer, 1 shade guide of original material, mixing pad, pictorial card, applicator tips, mixing well
  Art.no.: 66020511

Accessories

- PLT-Applikator STEEL
  (MARK III P), autoclavable, for Charisma, Durafill VS, Solitaire 2, Venus
  Art.no.: 66019748

Syringes	Art.no.:
4 g twist syringes	
■ Shade: A1	66007366
■ Shade: A2	66007367
■ Shade: A3	66007368
■ Shade: A3.5	66007369
■ Shade: A4	66008156
■ Shade: B1	66007370
■ Shade: B2	66007600
■ Shade: B3	66007601
■ Shade: C2	66007371
■ Shade: C3	66008086
■ Shade: C4	66007603
■ Shade: D2	66007372
■ Shade: D3	66008092
■ Shade: OA2	66007410
■ Shade: OA3	66008098
■ Shade: OA3.5	66007597
■ Shade: OB2	66007599
■ Shade: OC3	66007602
■ Shade: OC2	66007604
■ Shade: SB1	66007608
■ Shade: SB2	66007609
■ Shade: SBO	66007411
■ Shade: T1	66007373
■ Shade: T2	66007605
■ Shade: T3	66007606
■ Shade: HKA2.5	66007596
■ Shade: HKA5	66007598

PLT	Art.no.:
20 x 0.25 g PLT	
■ Shade: A1	66007979
■ Shade: A2	66007981
■ Shade: A3	66007983
■ Shade: A3.5	66007985
■ Shade: B1	66007988
■ Shade: B2	66008000
■ Shade: C2	66007989
■ Shade: OA2	66008012
■ Shade: HKA2.5	66007996
10 x 0.25 g PLT	
■ Shade: A4	66008159
■ Shade: B3	66008001
■ Shade: C3	66008089
■ Shade: C4	66008003
■ Shade: D2	66007992
■ Shade: D3	66008095
■ Shade: OA3	66008016
■ Shade: OA3.5	66007997
■ Shade: OB2	66007999
■ Shade: OC3	66008002
■ Shade: OD2	66008004
■ Shade: SB1 (super bleach)	66008008
■ Shade: SB2 (super bleach)	66008009
■ Shade: SBO (super bleach opaque)	66008014
■ Shade: T1 (translucent)	66007995
■ Shade: T2 (translucent)	66008005
■ Shade: T3 (translucent)	66008006
■ Shade: HKA5	66007998

Venus® flow – Product outline

Venus flow optimally enhances the performance of Venus in clinical situations, in which precise adaptation to the tooth is only attainable using a flowable material. Due to its thixotropic properties Venus flow only flows when moved by an instrument. Its variable consistency ensures that you are always in control of the material. Venus flow can be used on its own or in combination with Venus. All 14 shades of Venus flow are perfectly matched to the Venus shades.

Indications

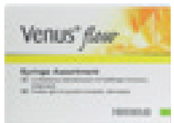
- Fissure sealing
- Extended fissure sealing
- Class V fillings
- Minimally invasive class I and II restorations in areas that are not subjected to masticatory forces
- Minimally invasive class III restorations
- Minor repairs of direct and indirect composite restorations
- Splinting of teeth
- Cavity lining
- Bonding brackets
- Minor shape and shade adjustments to enamel and dentine

Benefits

- Shades are optimally matched to Venus
- Thixotropic properties
- Broad indication spectrum
- Radiopaque

Syringe Assortment

- Venus flow Syringe Assortment
  1 x 1.8 g syringe each of shades
  A1, A2, A3, Baseliner,
  20 cannulas, mixing pad,
  pictorial card
  Art.no.: 66014561



Produkt	**Art.no.:**
1.8 g syringes	
■ Shade: A1	66014562
■ Shade: A2	66014563
■ Shade: A3	66014565
■ Shade: A3.5	66014566
■ Shade: A4	66014567
■ Shade: B2	66014568
■ Shade: B3	66014569
■ Shade: OA2	66014570
■ Shade: SB1 (super bleach)	66014571
■ Shade: SB2 (super bleach)	66014572
■ Shade: SBO (super bleach opaque)	66014573
■ Shade: T2 (translucent)	66014575
■ Shade: Baseliner	66014574
■ Shade: HKA2.5	66014564

Conception:
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Thanks to:
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