IPS e.max®

CAD

Abutment Solutions

Instructions for Use

ivoclar vivadent® technical

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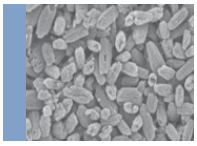

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Product Information

IPS e.max® System

IPS e.max is an innovative all-ceramic system which covers the entire all-ceramic indication range – from thin veneers to 14-unit bridges.

IPS e.max comprises highly esthetic high-strength materials for the PRESS and the CAD/CAM technologies. The system consists of innovative lithium disilicate glass-ceramics for smaller restorations and high-strength zirconium oxide for long-span bridges.

Every patient situation presents its own requirements and objectives. IPS e.max meets these requirements. Due to the system components you obtain exactly what you need.

– For the field of **Press technology** there is the **IPS e.max Press,** a highly esthetic **lithium disilicate glass-ceramic** and **IPS e.max ZirPress** a **fluor apaptite glass-ceramic ingot** for the quick and efficient press-on technique on zirconium oxide.

– For **CAD/CAM technology**, depending on the case requirements, either the **IPS e.max CAD**, an innovative **lithium disilicate block**, or the high-strength **zirconium oxide IPS e.max ZirCAD** can be used.

– The **nano-fluorapatite layering ceramic IPS e.max Ceram**, which is used to characterize and/or veneer all IPS e.max components – glass or oxide ceramics – completes the IPS e.max System.

IPS e.max® CAD

Three solutions for maximum flexibility

IPS e.max® CAD Solutions

IPS e.max CAD stands for individuality. Depending on the indication, users may select from three approaches: This ensures maximum flexibility in the digital work process.

IPS e.max® CAD
Monolithic Solutions

Efficient fabrication of full-contour restorations with high strength (≥ 360 MPa) ranging from thin veneers to three-unit bridges.

IPS e.max® CAD
Veneering Solutions

Digitally fabricated high-strength veneering structures for zirconium oxide frameworks (ZrO_2) – for tooth- and implant-retained crowns and long-span bridges (CAD-on).

IPS e.max® CAD
Abutment Solutions

Individual CAD/CAM-fabricated hybrid restorations for implants – for single-tooth restorations in the anterior and posterior region.

IPS e.max CAD is the innovative lithium disilicate glass-ceramic (LS_2) for the CAD/CAM technology. It is unique and combines an outstanding esthetic appearance with high user friendliness. The digitally fabricated restoration is selected from a comprehensive range of indications, which is only offered by IPS e.max CAD. A multitude of translucency levels, shades and block sizes enables flexible working. Proven and coordinated cementation materials ideally supplement the range of products.

These Instructions for Use describe the fabrication of **IPS e.max CAD Abutment Solutions**. There are separate Instructions for Use for **IPS e.max CAD Veneering Solutions** and **IPS e.max CAD Monolithic Solutions**.

Product Information

IPS e.max® CAD Abutment Solutions

Description

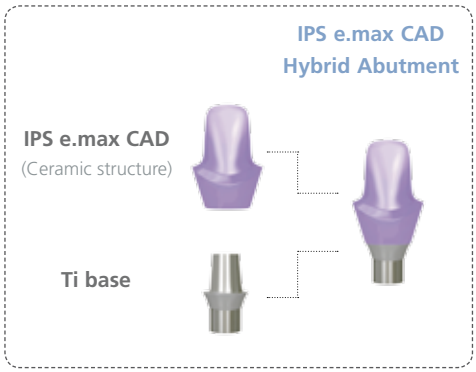
IPS e.max® CAD Abutment Solutions are CAD/CAM-fabricated, implant-supported hybrid restorations for single teeth. These hybrid restorations are individually fabricated from lithium disilicate glass-ceramics (LS_2) and cemented onto a titanium base (Ti base).

Two different approaches are available:
– IPS e.max CAD hybrid abutment and separate IPS e.max CAD crown
– IPS e.max CAD hybrid abutment crown

Both solutions show outstanding function, efficiency and esthetics. The durable bond to the Ti base is achieved by means of the self-curing Multilink® Hybrid Abutment luting composite.

Hybrid abutment

The hybrid abutment is an individually milled LS_2 abutment which is luted to the Ti base. The shape, emergence profile and esthetic properties of this abutment can be ideally adjusted to the clinical situation.

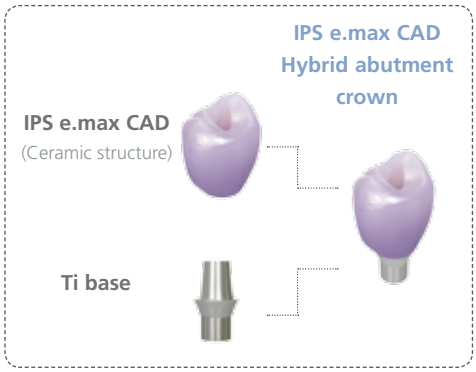


Given the lifelike appearance of LS_2 glass-ceramics, the esthetic possibilities are virtually limitless, particularly in the anterior region. Due to the individual characterization, a lifelike appearance is achieved near the root and the transition area to the crown. With the preparation margin of the crown located on the gingival level, the geometry of the hybrid abutments allows for an easy integration of the restoration. Excess cementation material is therefore easily removed.

The milled and crystallized LS_2 ceramic structure is extraorally luted to a Ti base with Multilink® Hybrid Abutment, then screwed into place in the oral cavity and finally provided with a permanent IPS e.max CAD crown. Given the convenient fabrication of the hybrid abutment, the process is time-saving and flexible.

Hybrid abutment crown

Hybrid abutment crowns are characterized by combining abutment and monolithic crown in one piece. This is an efficient two-in-one solution made from lithium disilicate (LS_2), which is directly luted to a Ti base.



LS_2 glass-ceramics provide for strength, durability and efficiency, particularly in the posterior area. Moreover, the material offers well-known esthetic properties, allowing restorations to be simply characterized with IPS e.max Ceram stains.

The monolithically milled hybrid abutment crown is extraorally luted to the Ti base by means of Multilink Hybrid Abutment. Then, the restoration is screwed onto the implant – in one piece. Subsequently, the screw access channel is sealed with a composite material (e.g. Tetric EvoCeram®). If required, the screw can be accessed at any time, which affords the dental team clinical flexibility.

IPS e.max CAD hybrid abutment crowns are a new, economically attractive alternative to conventional implant-supported restorations, particularly for the posterior area, where strength, durability and convenient clinical handling matter.

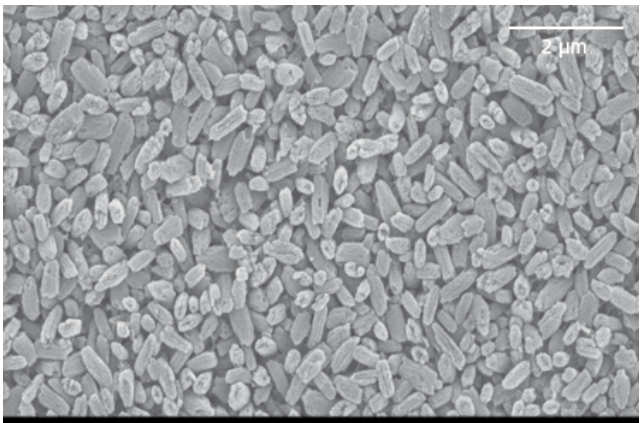
Ideally coordinated – Multilink® Hybrid Abutment

The self-curing luting composite Multilink Hybrid Abutment in conjunction with Monobond® Plus is used for the permanent cementation of ceramic structures made from lithium disilicate glass-ceramic (LS_2) or zirconium oxide (ZrO_2) onto bases (e.g. abutment or adhesive base) of titanium/titanium alloy. This allows
– reliable fixation due to high adhesion values
– optimum esthetics due to two available degrees of opacity
– easy handling due to the convenient Automix syringe

Material

IPS e.max® CAD

IPS e.max CAD is a lithium disilicate glass-ceramic block for the CAD/CAM technology. It is fabricated using an innovative process which provides an impressive homogeneity of the material. The block can be processed very easily in a CAD/CAM unit in this crystalline intermediate stage. The typical and striking colour of IPS e.max CAD ranges from whitish to blue and bluish-grey. This shade is a result of the composition and the microstructure of the glass-ceramic. The strength of the material in this processable intermediate phase is ≥ 130 MPa. After the IPS e.max CAD blocks are milled, the restoration is crystallized in an Ivoclar Vivadent ceramic furnace (e.g. Programat® P510). Unlike with some other CAD/CAM ceramics, the easy-to-conduct crystallization process neither causes any major shrinkage, nor are any complicated infiltration processes required. The crystallization process leads to a change in the microstructure in the IPS e.max CAD material, during which lithium disilicate crystals grow. The densification of 0.2% is compensated for in the CAD software and taken into account upon milling. The final physical properties, such as the strength of ≥ 360 MPa and the corresponding optical properties, are achieved through the transformation of the microstructure.



IPS e.max CAD — Lithium-Disilicate

CTE (25–500°C) [10^{-6}/K]	10.2 ± 0.5
Flexural strength (biaxial) [MPa]	≥ 360
Chem. solubility [µg/cm^2]	< 100

according to ISO 6872:2015
Classification: ceramic materials Type II / Class 3

Ti base

Ti bases are used for the fabrication of IPS e.max CAD Abutment Solutions. The suitable Ti bases are selected in accordance with the CAD/CAM System used. Please observe the relevant Ti base manufacturer's instructions for use and processing information.

Further information about the authorized CAD/CAM systems are available on the Internet from www.ivoclarvivadent.com.

IPS e.max CAD Abutments Solutions are also available from authorized milling centres (authorized milling partners of Ivoclar Vivadent). An overview of the materials and indications and the current titanium bases offered by each partner can be found at www.ivoclarvivadent.com/amp.

Uses

Indications

- Hybrid abutments for anterior and posterior single-tooth restorations
- Hybrid abutment crowns for anterior and posterior single-tooth restorations

Contraindications

- Failure to observe the requirements stipulated by the implant manufacturer for the selected implant (diameter and length of the implant must be approved for the respective position in the jaw by the implant manufacturer)
- Exceeding or falling short of the acceptable ceramic layer thicknesses
- Bruxism
- Use of a luting composite other than Multilink® Hybrid Abutment to lute IPS e.max CAD to the Ti base
- Intraoral adhesion of the ceramic structures to the Ti base.
- Temporary cementation of the crown on the hybrid abutment
- All uses not stated as indications are contraindicated.

Important processing restrictions

- Do not mill the blocks with non-compatible CAD/CAM systems.
- If hybrid abutment crowns are fabricated, the opening of the screw channel must not be located in the area of contact points. If this is not possible, a hybrid abutment with a separate crown should be preferred.
- Combination with materials other than IPS e.max Ceram, IPS Ivocolor or IPS e.max CAD Crystall./ materials
- Crystallization in a non-recommended ceramic furnace.
- Crystallization in a non-calibrated ceramic furnace.
- Crystallization in a high-temperature furnace (e.g. Programat® S1)
- Crystallization with deviating firing parameters
- Failure to observe the manufacturer's instructions regarding the processing of the Ti base.

Warning

- IPS Natural Die Material Separator contains hexane. Hexane is highly flammable and detrimental to health. Avoid contact of the material with skin and eyes. Do not inhale vapours and keep away from sources of ignition.
- Do not inhale ceramic dust during finishing – use extraction equipment and wear a face mask.
- IPS Ceramic Etching Gel contains hydrofluoric acid. Contact with skin, eyes and clothing must be prevented at all costs, since the material is extremely toxic and corrosive. The etching gel is intended for extraoral use only and must not be applied intraorally (inside the mouth).
- Monobond Etch & Prime is corrosive. Avoid contact with the skin and mucous membrane. Monobond Etch & Prime is intended for extraoral use only and must not be applied intraorally (inside the mouth).
- Observe the Safety Data Sheet (SDS).

Scientific Data

Since the beginning of the development, the IPS e.max System has been monitored by the scientific community. Many renowned experts have contributed to an excellent data base with their studies. The worldwide success story, the ever growing demand, as well as over 70 million (as per 2013) fabricated restorations are testament to the success and the reliability of the system. More than 20 clinical in vivo studies to date and even more in vitro studies, as well as the continuously rising number of clinical studies throughout the world show the long-term success of the IPS e.max System in the oral cavities of the patients. The most important study results are compiled in the "IPS e.max Scientific Report".

Further scientific data (i.e. strength, wear, biocompatibility) are contained in the "Scientific Documentation IPS e.max CAD". It can be obtained from Ivoclar Vivadent.

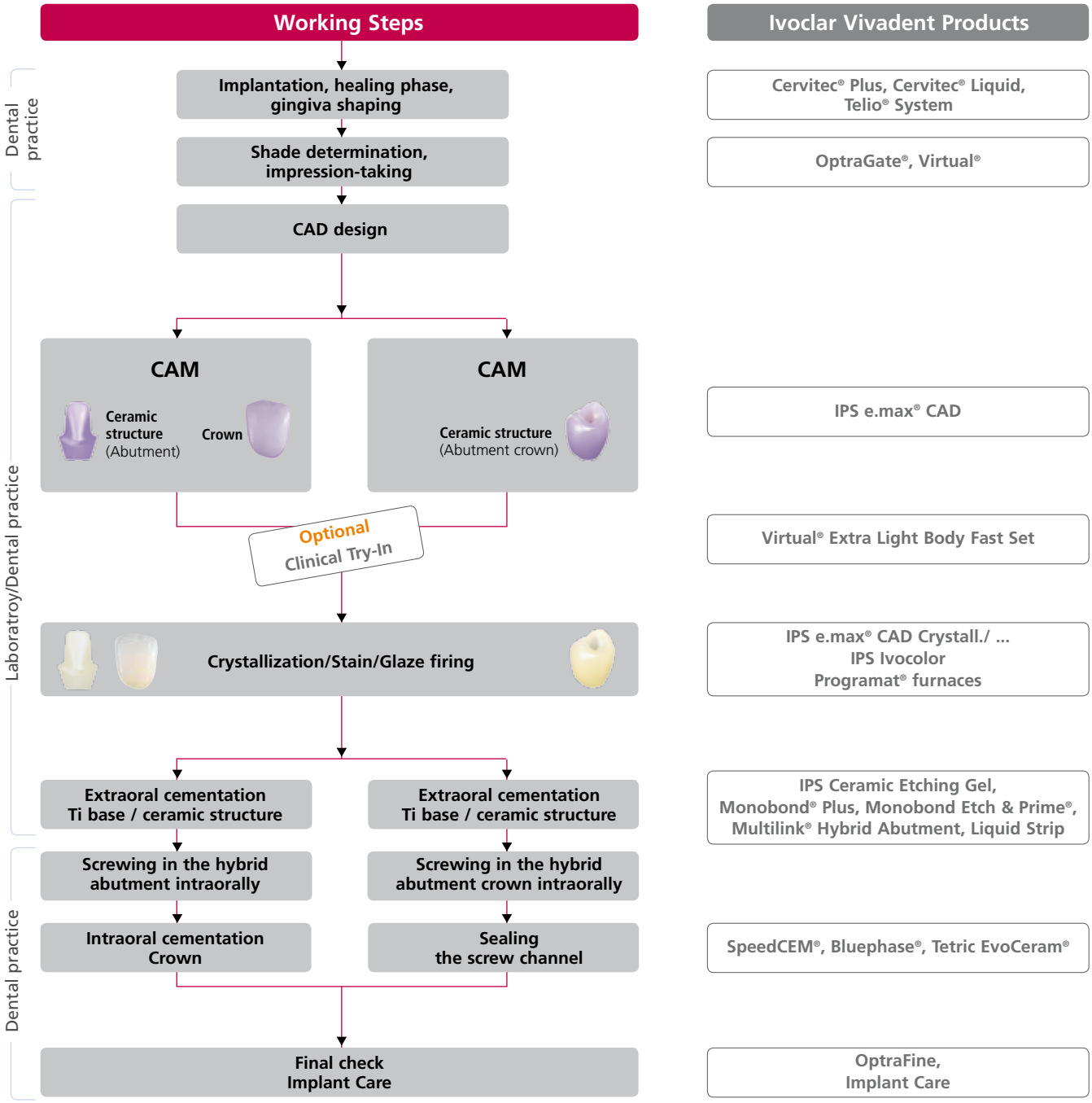
For further information about all-ceramics and IPS e.max, please refer to the Ivoclar Vivadent Report No. 16 and 17.

CAD/CAM Partners

IPS e.max CAD has to be processed with an authorized CAD/CAM system. For questions regarding the different systems, please contact the respective cooperation partners.

Further information are available on the Internet from **www.ivoclarvivadent.com.**

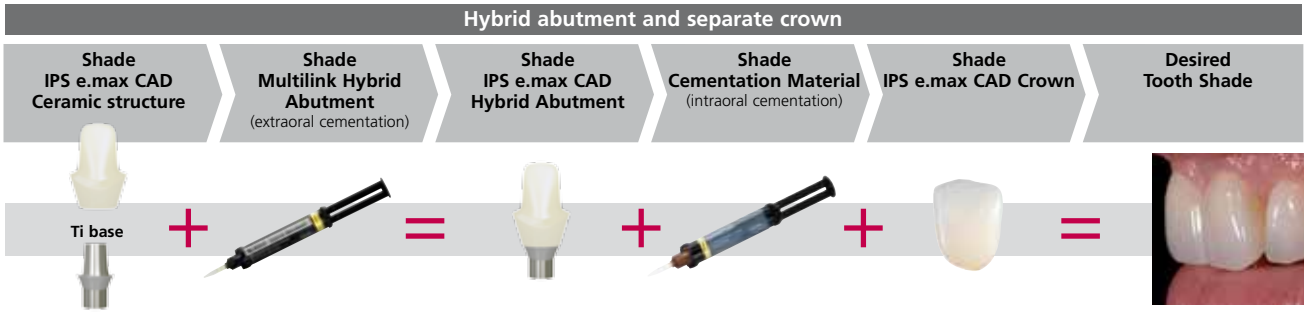
Fabrication IPS e.max CAD Hybrid Abutment and Hybrid Abutment Crown



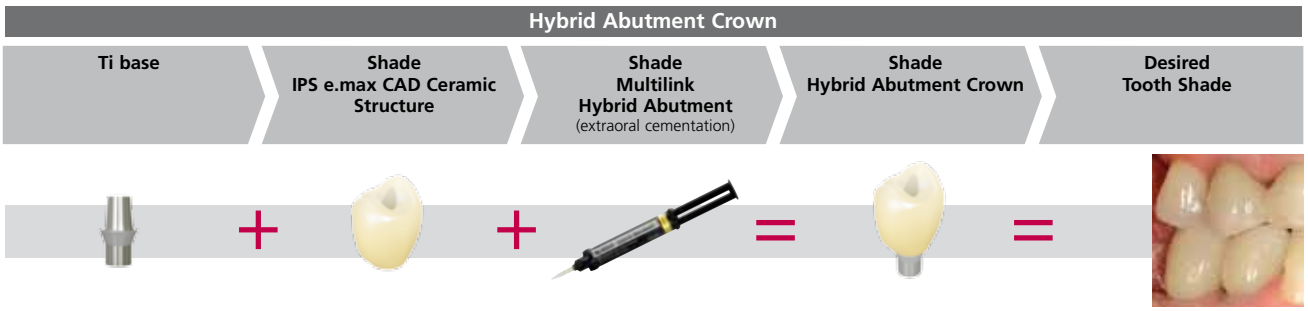
Shade – Tooth shade and abutment shade

Optimum integration in the oral cavity of the patient is the prerequisite for a true-to-nature all-ceramic restoration. To achieve this, the following guidelines and notes must be observed.
With IPS e.max CAD Abutment Solutions, you can imitate not only the clinical crown of a natural tooth, but also a part of the root. This allows you to achieve highly esthetic implant-retained restorations which maintain their lifelike appearance even in case of gingival recession.

For the IPS e.max CAD **hybrid abutment and the separate crown**, the desired tooth shade results from
- the shade of the IPS e.max CAD hybrid abutment (IPS e.max CAD MO ceramic structure, Multilink Hybrid Abutment),
- the shade of the luting material for intraoral cementation of the crown on the IPS e.max CAD hybrid abutment (e.g. SpeedCEM)
- the shade of the IPS e.max CAD crown



For the IPS e.max CAD **Hybrid Abutment Crown**, the desired tooth shade results from
- the shade of the IPS e.max CAD ceramic structure
- the shade of Multilink Hybrid Abutment



Preparation for the CAD/CAM Process

Scanning

For the fabrication of IPS e.max CAD Abutment Solutions and depending on the CAD/CAM system used, the clinical situation is digitalized either by a direct intraoral scan or an indirect model scan. For notes regarding the scan, please observe the manufacturer's instructions of the CAD/CAM system.

Selecting a Ti base

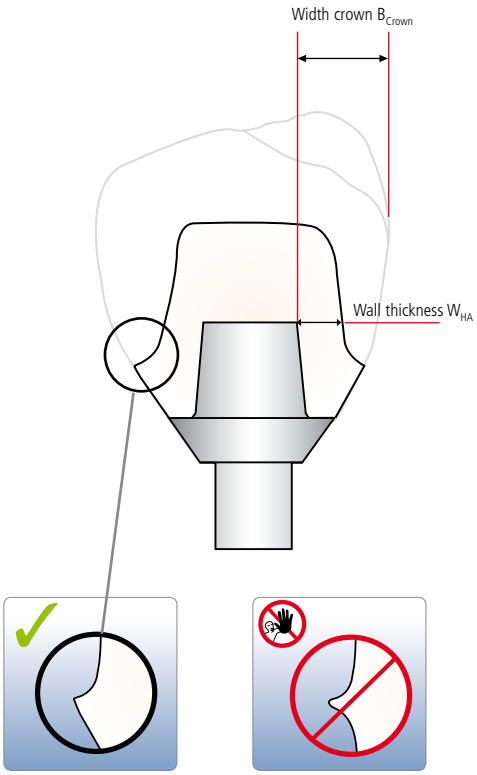
The required Ti base is selected depending on the inserted implant and the CAD/CAM system used.

Minimum layer thicknesses of the ceramic components

Observing the geometry requirements of the IPS e.max CAD ceramic structures is the key to success for a durable restoration. The more attention is given to the design, the better the final results and the clinical success will turn out to be.

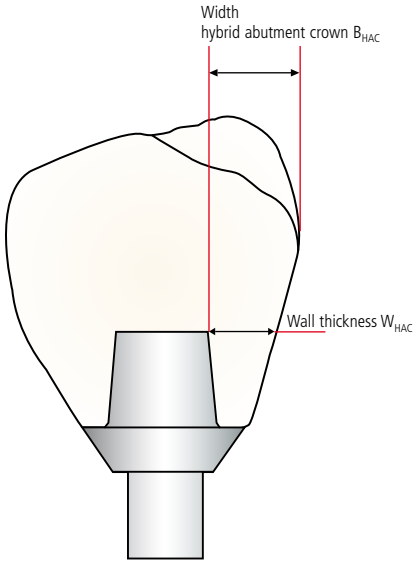
The following basic guidelines have to be observed:

Hybrid Abutment



- The **wall thickness W_{HA}**, must be at least 0.5 mm.
- The hybrid abutment should be designed in a similar way as a prepared natural tooth:
  - Circular epi-/supragingival shoulder with rounded inner edges or a chamfer.
  - In order for the crown to be cemented to the hybrid abutment using a conventional/self-adhesive cementation protocol, retentive surfaces and a sufficient "preparation height" must be observed.
  - Create an emergence profile with a right angle at the transition to the crown (see picture).
- The **crown width B_{Crown}** is limited to 6.0 mm from the axial height of contour to the screw channel of the hybrid abutment.
- The notes of the implant manufacturer regarding the maximum height of the hybrid abutment and separate crown must be observed.

Hybrid Abutment Crown



- The wall thickness **W_{HAC}** of **hybrid abutment crowns** must be larger than 1.5 mm around the entire equatorial circumference.
- The opening of the screw channel must not be located in the area of contact points. If this is not possible, a hybrid abutment with a separate crown would be preferred.
- The width of the **hybrid abutment crown B_{HAC}** is limited to 6.0 mm from the axial height of contour to the screw channel.
- The notes of the implant manufacturer regarding the maximum height of the hybrid abutment crown must be observed.

Block selection

The block is selected in accordance with the desired tooth shade and the selected Ti base. An IPS e.max CAD MO or LT block is selected depending on the indication.

	 IPS e.max CAD **MO A14** (Medium Opacity)	 IPS e.max CAD **LT A14** (Low Translucency)	 IPS e.max CAD **LT A16** (Low Translucency)
 **IPS e.max CAD Hybrid Abutment**	✓	✓	✗
 **IPS e.max CAD Hybrid Abutment Crown**	✗	✓	✓

Please refer to the table on **page 62** for the **selection of the block shade** for the desired tooth shade.

CAD/CAM preparation

During crystallization the IPS e.max CAD densifies by about 0.2%. The respective software in the tested CAD/CAM system automatically compensates for this value. Consequently, the milled IPS e.max CAD restorations demonstrate precision fit after crystallization. The fabrication steps are described in the directions for use and user manuals of the different CAD/CAM systems. The manufacturer's instructions must be observed.

Finishing

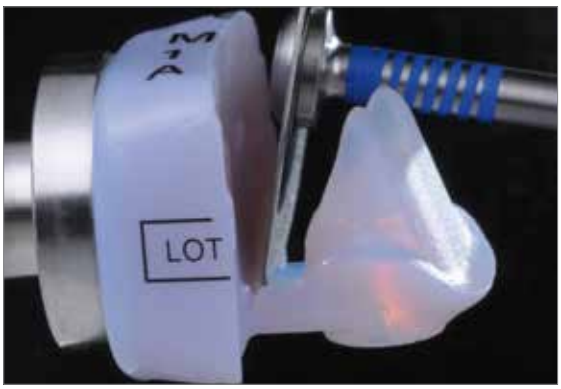
It is of critical importance to use the correct grinding instruments for finishing and adjusting the IPS e.max CAD ceramic structure. If unsuitable grinding instruments are used, chipping of the edges and local overheating may occur (please observe the Ivoclar Vivadent Flow Chart "Recommended grinding tools for PS e.max glass-ceramics").

Basic notes regarding the finishing of IPS e.max CAD

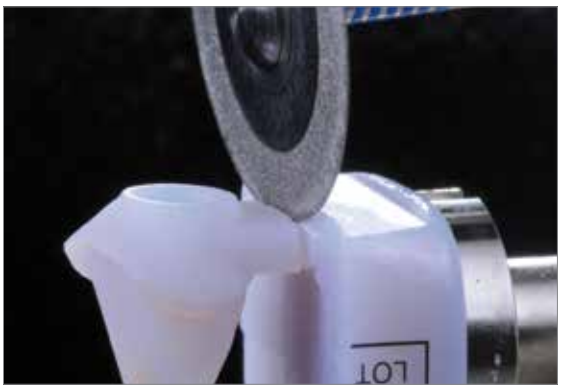
- If possible, carry out adjustments by grinding IPS e.max CAD restorations while they are still in their pre-crystallized (blue) state.
- Only use suitable grinding instruments, low speed and light pressure to prevent delamination and chipping at the margins in particular. **Overheating of the glass-ceramic must be avoided.**
- During finishing, make sure that the minimum layer thicknesses are observed.
- Cut the ceramic structure from the block using a diamond separating disc. Slightly scratch the attachment area at the incisal side of the abutment and separate the attachment point from the basal.

Checking the fit of the ceramic structures on the Ti base

- Carefully place the ceramic structure on the Ti base and check the fit. Observe the position of the rotation lock.



Scratch the incisal side of the attachment point by means of a diamond separating disc.



Cut the attachment from the basal using a diamond separating disc.

Carefully place the ceramic structure on the Ti base and check the fit.

Optimum fit of the ceramic structure on the Ti base.

Finishing

– Do not grind the shoulder of the ceramic structure so as not to affect the accurate fit on the Ti base.
– If necessary, finish the emergence profile taking the fit to the gingiva and the minimum thickness (0.5 mm) into account.

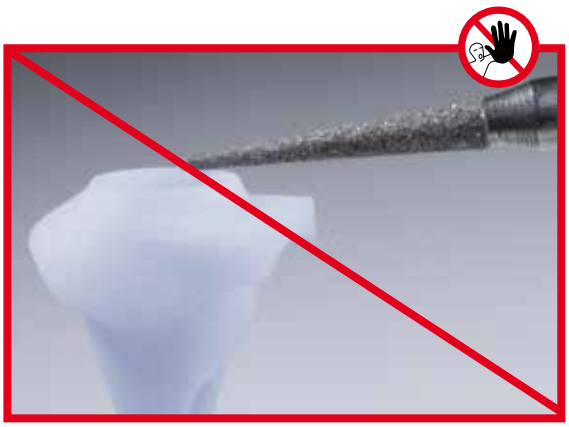
Finishing the outer surface of the ceramic structure (hybrid abutment)

– Smooth out the attachment point to the block with fine diamond grinding instruments taking the shape of the emergence profile and the crown margin into account.
– Do not perform any individual shape adjustments, as this negatively affects the fit of the crown on the hybrid abutment. **Note regarding the crown**: If the fit on the hybrid abutment is inaccurate, carry out adjustments on the crown.

Finishing the outer surface of the ceramic structure (hybrid abutment crown)

– Smooth out the attachment point to the block with fine diamond grinding instruments taking the shape of the emergence profile and the proximal contacts into account.
– Surface-grind the entire occlusal surface with a fine diamond to smooth out the surface structure created by the CAD/CAM procedure.
– Check the proximal and occlusal contacts.
– Design surface textures.

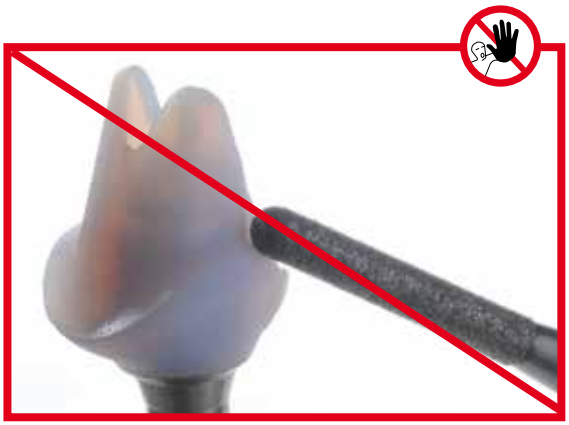
– Clean the ceramic structures with ultrasound in a water bath or blast with the steam jet before further processing.
– Make sure to thoroughly remove any residue of the milling additive of the CAD/CAM milling unit. Residue of the milling additive remaining on the surface may result in bonding problems and discolouration.
– Do **not** blast ceramic structures with Al_2O_3 or glass polishing beads!



Do not grind the shoulder of the ceramic structure so as not to affect the accurate fit on the Ti base.

Be careful when finishing the emergence profile to prevent affecting the fit to the gingiva.

Smooth out the attachment point to the block taking the shape of the emergence profile and the crown margin into account.



Do not perform any individual shape adjustments, as this negatively affects the fit of the crown on the hybrid abutment.

Smooth out the attachment point to the block taking the shape of the emergence profile and the crown margin into account.

Surface-grind the ceramic structure with a fine diamond to smooth out the surface structure created by the CAD/CAM procedure.

Place the crown on the ceramic structure to finish the crown margins. In this way, a smooth transition between the crown and hybrid abutment can be achieved.

Next working step …

Optional: Clinical Try-In page 17

Completing the IPS e.max CAD ceramic structure page 22

Optional: Clinical Try-In

A clinical try-in to check the accuracy of fit can be conducted prior to further processing. Clinical try-in may also take place at a later stage, i.e. with the crystallized, tooth-coloured IPS e.max CAD ceramic structure.

Provisional fixation of the ceramic structure on the Ti base

To facilitate the intraoral handling, the components are temporarily attached to one another with silicone material, e.g. Virtual Extra Light Body Fast Set.

The following procedure should be observed in the temporary attachment of the components:
- The untreated base and the ceramic structure are steam cleaned and then dried with compressed air.
- The ceramic structure is placed on the base (which is screwed on the model analog) and the relative position of the components is marked with a waterproof pen. This step makes it easier to attain the correct position when the parts are temporarily assembled.
- The screw channel is sealed with a foam pellet.
- The Virtual cartridge is inserted in the dispenser and the protective cap is removed.
- The mixing tip is screwed on and the Oral Tip is attached to the mixing tip.
- Virtual Extra Light Body Fast Set is applied to the base and directly into the ceramic structure.
- The base is introduced into the ceramic structure. The alignment of the two components must be checked (rotation lock/marking).
- The components should be held firmly in the correct position for 2:30 minutes until Virtual Extra Light Body Fast Set has set.
- Any excess that has been displaced must be carefully removed with a suitable instrument, e.g. a scalpel.

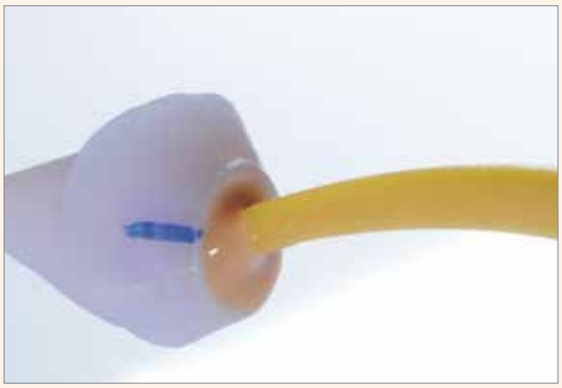
Cleaned, untreated ceramic structures.

Place the ceramic structure on the TI base and mark the relevant position.

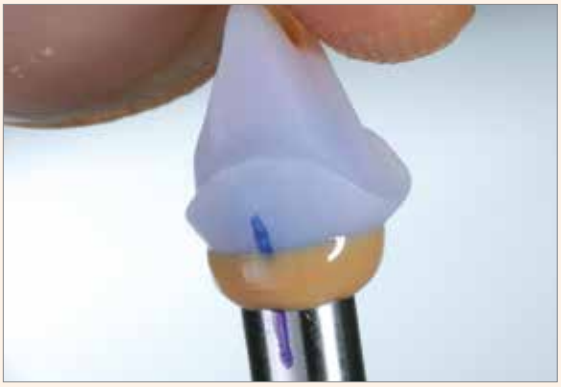
The screw channel is sealed with a foam pellet.

The Virtual cartridge is inserted in the dispenser. The mixing tip is screwed on and the Oral Tip is attached.

Virtual Extra Light Body Fast Set is applied to the base and ...



... directly on the ceramic structure.



The base is introduced into the ceramic structure. In doing so, the alignment of the two components is checked (rotation lock marking). The components are firmly held in place for approx. 2:30 minutes until the Virtual Extra Light Body Fast Set has set.

Excess Virtual Extra Light Body Fast Set is removed from the screw channel with an instrument, e.g. a scalpel.

Remove excess Virtual Extra Light Body Fast Set material from the screw channel with an instrument.

Prepared hybrid abutment or hybrid abutment crown.

Clinical Try-In

Hybrid abutment and corresponding crown

Any intraoral inspection of the occlusion/articulation and necessary grinding adjustments may only be carried out if the components have been attached to one another with Virtual Extra Light Body Fast Set. Virtual Extra Light Body Fast Set has a cushioning effect during the try-in procedure, in particular, if any grinding adjustments have to be made. Therefore, it prevents chipping in the transition area between the hybrid abutment and the crown.

The following procedure should be observed for the clinical try-in:

- The prepared hybrid abutment (provisionally secured in place) and the clean corresponding crown are laid out.
- The provisional restoration is removed.
- The hybrid abutment is screwed in manually with the dedicated screw.
- The geometry of the hybrid abutment is checked (e.g. fit, gingival anaemia) in relation to the gingival margin.
- If desired, the screw channel on the hybrid abutment can be sealed with a foam pellet.
- **Tip**: Isolate the inner aspect of the crown with glycerine gel, e.g. Try-in paste, Liquid Strip
- Place the crown on the hybrid abutment intraorally to check and if necessary adjust the approximal contacts.
  Attention: No occlusal functional inspection must be performed at this stage.
- For the functional inspection, the crown has to be secured on the hybrid abutment with Virtual Extra Light Body Fast Set. Try-in paste must not be used for this purpose, as this material is not sufficiently resistant to compressive force.
- The Virtual cartridge is inserted in the dispenser and the protective cap is removed.
- The mixing tip is screwed on and the Oral Tip is attached to the mixing tip.
- Virtual Extra Light Body Fast Set is applied to the inner aspect of the crown.
- The crown is pressed onto the hybrid abutment using the fingers until the final position is reached. The crown is held in the final position until the Virtual material has set.
- Excess Virtual material is removed.
- The occlusion/articulation is checked and if necessary adjustments are made with suitable grinding instruments (see separate IPS e.max recommended grinding instruments for ceramics – use in the dental practice).
- The crown is carefully removed from the hybrid abutment and the hybrid abutment from the implant (including the base).
- Rinse the implant site e.g. with Cervitec Liquid (antibacterial mouth wash with chlorhexidine) to clean and disinfect it.
- The temporary restoration is placed.

The hybrid abutment is manually screwed in place with the dedicated screw. The geometry of the hybrid abutment (e.g. fit, gingival anaemia) is checked in relation to the gingival margin.

If desired, the screw channel of the hybrid abutment can be sealed with a foam pellet.

Tip: The inner aspect of the crown can be isolated with glycerine gel.

The crown is placed on the hybrid abutment intraorally to check and if necessary adjust the proximal contacts. **Attention: No occlusal functional inspection must be performed at this stage.**

Virtual Extra Light Body Fast Set is applied to the inner aspect of the crown.

The crown is pressed onto the hybrid abutment using the fingers until the final position is reached. The crown is held in the final position until the Virtual material has set.

Excess Virtual material is removed.

The occlusion/articulation is checked and if necessary adjustments are made with suitable grinding instruments.

The crown is carefully lifted from the hybrid abutment and the Virtual Extra Light Body Fast Set material is removed.

The hybrid abutment is unscrewed.

Hybrid Abutment Crown

The following procedure should be observed for the clinical try-in:

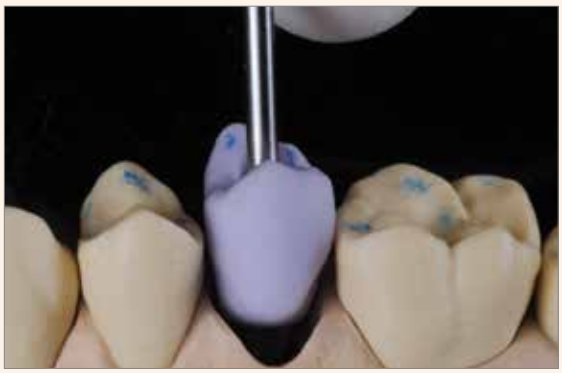
- The prepared and cleaned hybrid abutment crown (provisionally secured in place with Virtual Extra Light Body Fast Set) is laid out.
- The provisional restoration is removed.
- The hybrid abutment crown is placed on the implant intraorally in order to check and if necessary adjust the proximal contacts. **Attention: No occlusal functional inspection must be performed at this stage.**
- The hybrid abutment crown is screwed in manually with the dedicated screw.
- The geometry of the hybrid abutment crown (e.g. fit, gingival anaemia) is checked in relation to the gingiva.
- The occlusion/articulation is checked and if necessary adjustments are made with suitable grinding instruments (see separate IPS e.max recommended grinding instruments for ceramics – use in the dental practice).
- The hybrid abutment crown is carefully removed.
- The implant site is rinsed, e.g. with Cervitec Liquid (antibacterial mouth rinse containing chlorhexidine) to clean and disinfect it.
- The temporary restoration is placed.

The hybrid abutment crown is placed on the implant intraorally in order to check and if necessary adjust the proximal contacts. **Attention: No occlusal functional inspection must be performed at this stage.**

The hybrid abutment crown is screwed in with the dedicated screw.

The geometry of the hybrid abutment crown (e.g. fit, gingival anaemia) is checked in relation to the gingiva.

The occlusion/articulation is checked and if necessary adjustments are made with suitable grinding instruments.



The hybrid abutment crown (including base) is carefully removed.

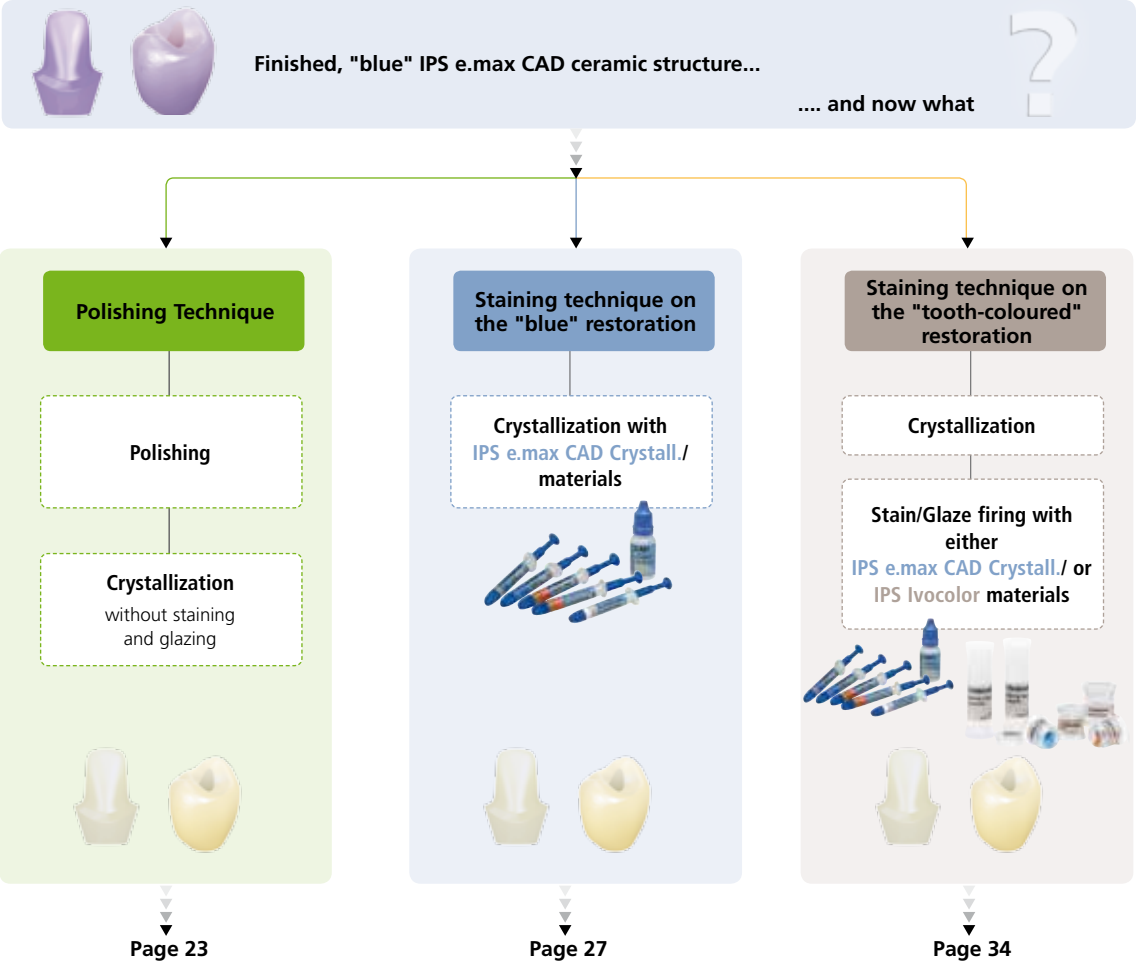
Completing the IPS e.max CAD ceramic structure

The processing method is selected according to the processing technique and materials. Basically, there are three possible ways to complete the ceramic structure.

- **Polishing technique**
  Polishing of the "blue" restoration, followed by **crystallization** without individual characterization and glaze.

- **Staining technique on the "blue" restoration**
  Staining and **glazing** with **IPS e.max CAD Crystall./ materials** on the blue restoration, followed by the **crystallization** and **Stain/Glaze firing in one step**.

- **Staining technique on the tooth-coloured restoration**
  Crystallization without the application of materials. **Stain/Glaze firing** of the tooth-coloured restorations with either IPS e.max CAD Crystall./ or IPS Ivocolor materials.



Polishing Technique

Polishing of the "blue" restoration, followed by crystallization without individual staining and glazing.

If **no staining** and **no Glaze firing** are desired, it is possible to polish the ceramic structure manually, followed by crystallization. Please note that polishing causes slight abrasion.

The polishing technique is preferably used for the emergence profile of the hybrid abutment. For the hybrid abutment crown, the application of glaze is recommended.

On hybrid abutments, only the emergence profile is polished.

On hybrid abutment crowns, the entire outer aspect is polished.

Polishing

Please observe the following procedure for polishing the pre-crystallized (blue) ceramic structure:

- Clean the ceramic structure with ultrasound in a water bath or a steam cleaner to remove any contaminations and grease residue.
- Screw Ti base onto a model analog for easier handling.
- Secure the ceramic structure on the Ti base. **Note**: Do **not** grind the Ti base.
- **Any overheating of the glass-ceramic must be avoided during polishing.** Observe the manufacturer's instructions for use of the grinding tools.
- Pre-polishing with a diamond rubber polisher (e.g. OptraFine F).
- Fine polishing with a high-gloss rubber polisher (e.g. OptraFine P).
- High-gloss polishing with brushes and polishing paste (e.g. OptaFine HP)
- Clean the ceramic structure with ultrasound in a water bath or the steam jet.

Pre-polishing by means of diamond rubber polishers.

Fine polishing by means of high-gloss rubber polishers.

High-gloss polishing with brushes and polishing paste.

Remove residue with ultrasound in a water bath…

...or with the steam jet.

Crystallization

The following steps must be observed:

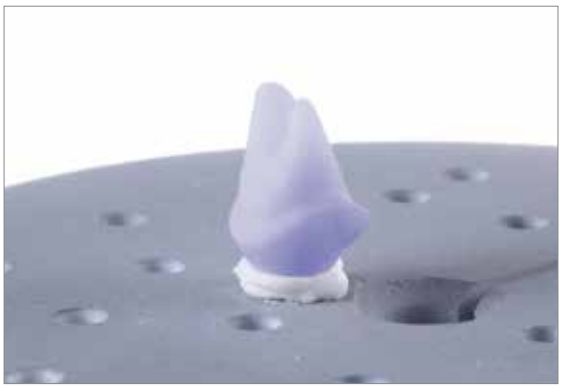
- Clean the ceramic structure to remove any contaminations and grease residue. Any contamination after cleaning must be prevented.
- Slightly overfill the interface of the ceramic structure with IPS Object Fix Putty or Flow.
  Immediately reseal the IPS Object Fix Putty/Flow syringe after extruding the material.
- Place the ceramic structure in the centre of the IPS e.max CAD Crystallization Tray.

Observe the firing parameters for IPS e.max CAD MO and IPS e.max CAD LT.

Conduct the **crystallization** on the IPS e.max CAD Crystallization Tray using the stipulated firing parameters.
Firing parameters see page 64

If a restoration made of IPS e.max CAD MO and one made of IPS e.max CAD LT are to be crystallized in the same firing cycle, the firing parameters for IPS e.max CAD MO must be used!

- Remove ceramic structure from the furnace after completion of the firing cycle (wait for the acoustic signal of the furnace).
- Allow the objects to cool to room temperature in a place protected from draft.
- Do not touch the hot objects with metal tongs.
- Remove the ceramic structure from the IPS e.max CAD Crystallization Tray.
- Remove any residue with ultrasound in a water bath and/or with steam.
- Do **not** remove residue with Al_2O_3 or glass polishing beads.
- Place the ceramic structure on the Ti base and check the fit.
- **If grinding adjustments are required, make sure that the ceramic does not overheat.**
- After carrying out the adjustments, polish the adjusted areas to a high gloss.



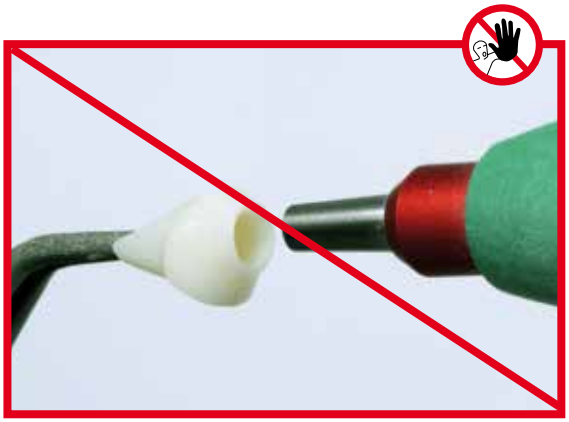
Slightly overfill the interface of the ceramic structure with IPS Object Fix Putty or Flow and place it in the centre on the IPS e.max CAD Crystallization Tray.

Remove the crystallization tray from the furnace once the crystallization program has been completed and allow the object to cool

Remove the ceramic structure from the IPS e.max CAD Crystallization Tray.

Remove residue with ultrasound in a water bath….

… or with the steam jet.



Do **not** remove residue with Al_2O_3 or glass polishing beads.

Polished, crystallized ceramic structure

Next working step … **Permanent cementation Ti base / ceramic structure page 46**

Staining technique on the "blue" restoration

Characterization and glaze with IPS e.max CAD Crystall./ materials on the "blue" restoration, followed by a crystallization firing cycle.

The following paragraphs will explain the steps for staining and glazing with IPS e.max CAD Crystall./Shades, Stains and Glaze. In this processing technique, crystallization and Glaze firing are performed in one step. Characterizations are applied using IPS e.max CAD Crystall./Shades and Stains.

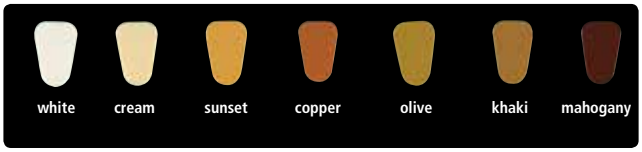
If hybrid abutments are fabricated, only the area of the emergence profile is characterized with IPS e.max CAD Crystall./Shades, Stains and Glaze

If hybrid abutment crowns are fabricated, the entire outer surface may be individually characterized.

Required materials

– IPS e.max CAD Crystall./Shades are ready-to-use "Dentin" stains in syringes.

– IPS e.max CAD Crystall./Stains are ready-to-use intensive stains in syringes.



– IPS e.max CAD Crystall./Glaze Paste is a ready-to-use glazing paste
– IPS e.max CAD Crystall./Glaze Liquid is a special liquid for mixing with Shades, Stains and Glaze.

The IPS e.max CAD Crystall./**Glaze Spray** is **not** recommended for glazing IPS e.max CAD Abutment Solutions, as it requires very targeted application. The glazing material must neither reach the bonding surface to the Ti base nor the screw channel, as this may compromise the accuracy of fit.

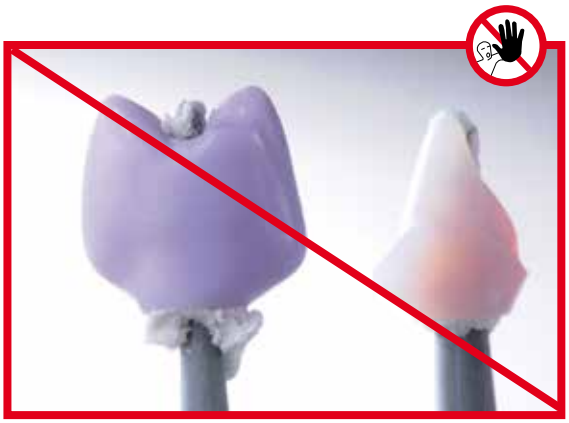
Preparing for Crystallization and Stain/Glaze firing in one step

- Clean the ceramic structure with the steam jet to remove any contaminations and grease residue. Any contamination after cleaning must be prevented.
- Use the **IPS e.max CAD Crystallization Pin XS** for the crystallization of the ceramic structure.
- Fill the interface of the ceramic structure with either IPS Object Fix Putty or Flow auxiliary firing paste. **Immediately reseal the IPS Object Fix Putty/Flow syringe after extruding the material.**
- Press the **IPS e.max CAD Crystallization Pin XS only slightly** into the IPS Object Fix Putty/Flow. **Important: Do not press the pin in too deep to make sure that it does not touch the walls. This may lead to cracks in the ceramic structure.**
- Smooth out displaced auxiliary firing paste using a plastic spatula so that the pin is securely in place.
- Prevent contamination of the outer surface / occlusal surface of the ceramic structure.
- Clean off any possible contamination with a brush dampened with water and dry.

Use the IPS e.max CAD Crystallization Pin XS for the crystallization of the ceramic structure.

Fill the interface of the ceramic structure with either IPS Object Fix Putty or Flow firing paste.

Important: Press the IPS e.max CAD Crystallization Pin XS only slightly into the IPS Object Fix Putty/Flow so that it does not touch the walls of the ceramic structure.



Incorrect: Pin pressed in too deep. Pin touches the ceramic structure, which may lead to cracks.

Smooth out displaced auxiliary firing paste with a plastic spatula from the margin towards the support pin so that the pin is secured in the paste.

Clean off any possible residue adhering to the outer surface/occlusal surface with a brush dampened with water and dry

Crystallization and Stain/Glaze firing in one step

Please observe the following procedure for the crystallization:
- Extrude the ready-to-use IPS e.max CAD Crystall./Glaze Paste from the syringe and mix.
- If a slight thinning is desired, the ready-to-use glaze may be mixed with a small amount of IPS e.max CAD Crystall./Glaze Liquid.

- The glazing material must neither reach the bonding surface to the Ti base nor the screw channel, as this may compromise the accuracy of fit. Check the interface before firing and carefully remove any contamination.
- On the abutment, do not apply any materials to the bonding surface to the crown, as this might compromise the fit of the crown.

- Apply IPS e.max CAD Crystall./Glaze Paste evenly on the areas to be glazed using a small brush. Do not apply the glaze layer too thickly. Avoid "pooling", especially on the occlusal surface of the abutment crown.
- Too thin a glaze layer may lead to an unsatisfactory gloss.
- Apply characterizations with IPS e.max CAD Crystall./Shades and/or IPS e.max CAD Crystall./Stains. For that purpose, extrude the Shades and Stains from the syringe and mix. If necessary, slightly thin them using IPS e.max CAD Crystall./ Glaze Liquid. However, the consistency should still remain pasty.
- Apply mixed Shades and Stains directly into the unfired glaze layer using a fine brush. More intensive shades are achieved by several staining procedures and repeated firing, not by applying thicker layers.
- To imitate the incisal area and translucency of the hybrid abutment crown in the incisal and occlusal third, IPS e.max CAD Crystall./Shades Incisal may be used. The cusps and fissures can be individualized using Stains

Optional:

IPS e.max CAD Crystall./Add-On can be used for minor shape adjustments (e.g. proximal or occlusal contact points). The detailed procedure is described on page 33.

After glazing and staining, the crystallization is conducted in a compatible ceramic furnace (e.g. Programat® CS3 or Programat P510). When placing the objects into the furnace and setting the firing parameters, observe the following points:
- Place the restoration in the centre of the IPS e.max CAD Crystallization Tray.
- A maximum of 6 units can be positioned on the firing tray and crystallized with IPS e.max CAD Crystall./Glaze Paste.

Observe the firing parameters for IPS e.max CAD MO and IPS e.max CAD LT.

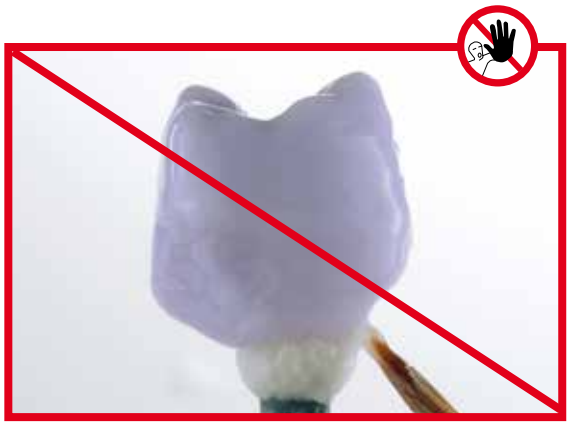
Conduct the **crystallization** on the IPS e.max CAD Crystallization Tray.
Firing parameters see page 64

If a restoration made of IPS e.max CAD MO and one made of IPS e.max CAD LT are to be crystallized in the same firing cycle, the firing parameters for IPS e.max CAD MO must be used!

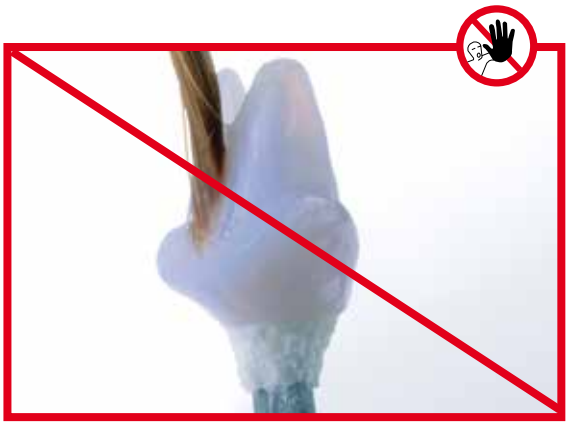
- Remove restoration from the furnace after completion of the firing cycle (wait for the acoustic signal of the furnace).
- Allow the objects to cool to room temperature in a place protected from draft.
- Do not touch the hot objects with metal tongs.

Extrude IPS e.max CAD Crystall./Glaze Paste from the syringe and mix.
If required, thin with IPS e.max CADCrystall./Glaze Liquid.

Apply IPS e.max CAD Crystall./Glaze Paste evenly on the emergence profile of the hybrid abutment or the outer surface of the hybrid abutment crown.



Important: The glazing material must neither reach the bonding surface to the Ti base nor the screw channel, as this may compromise the accuracy of fit.



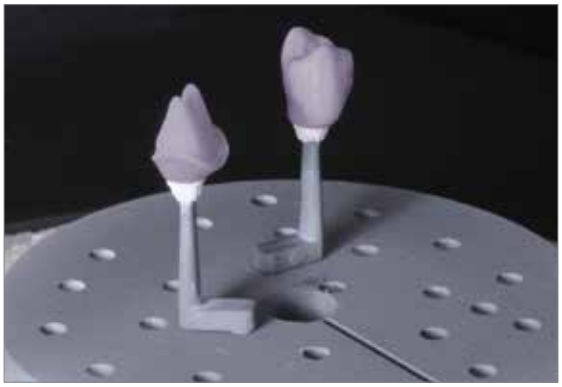
Important: Do not apply materials to the bonding surface to the crown, as this might compromise the fit of the crown.

Apply individual characterizations of the emergence profile using IPS e.max CAD Crystall./Shades.

Enhancing the chroma on the buccal surface with IPS e.max CAD Crystall./Shades.

Apply IPS e.max CAD Crystall./Shade Incisal to imitate the incisal area.

Optional: For minor shape adjustments (e.g. proximal contact points), use IPS e.max CAD Crystall./Add-On.



Place the ceramic structure in the centre of the IPS e.max CAD Crystallization Tray. Conduct the **crystallization** using the stipulated **firing parameters**. Observe the firing parameters for **IPS e.max CAD MO** and **IPS e.max CAD LT**.

Remove ceramic structure from the furnace after completion of the firing cycle (wait for the acoustic signal of the furnace).

Optional

Corrective firing

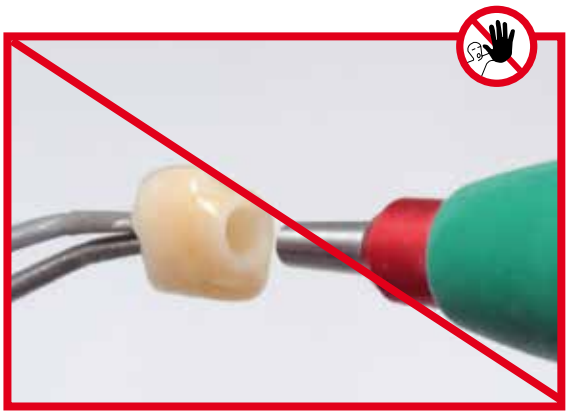
If characterizations or adjustments are required after crystallization, a corrective firing using IPS e.max CAD Crystall./Shades and Stains and Glaze can be conducted. Conduct the corrective firing also on the IPS e.max CAD Crystallization Tray.
For minor shape adjustments (e.g. proximal or occlusal contact points), IPS e.max CAD Crystall./Add-On is available.
The detailed procedure is described on page 33.

Once the IPS e.max CAD ceramic structures have cooled to room temperatures, proceed with the following steps:
- Remove the ceramic structure from the IPS e.max CAD Crystallization Pin XS.
- Remove any residue with ultrasound in a water bath and/or with the steam jet.
- Do **not** remove residue with Al_2O_3 or glass polishing beads.
- Place the ceramic structure on the Ti base and check the fit.
- **If grinding adjustments are required, make sure that the ceramic does not overheat.**
- After carrying out the adjustments, polish the adjusted areas to a high gloss.

Remove the ceramic structure from the IPS e.max CAD Crystallization Pin XS.

Remove residue with ultrasound in a water bath….

… or with the steam jet.



Do **not** remove residue with Al_2O_3 or glass polishing beads.

Glazed and characterized ceramic structures (hybrid abutment crown and hybrid abutment).

Optional

Shape adjustments with IPS e.max CAD Crystall./Add-On

For minor shape adjustments (e.g. proximal contact points), IPS e.max CAD Crystall./Add-On is available. The adjustments may be made with both the crystallization or a separate corrective firing.

Processing

- Mix IPS e.max CAD Crystall/Add-On with IPS e.max CAD Crystall/Add-On Liquid to an easy-to-contour consistency.
- Ensure even mixing of the add-on material and the liquid in order to achieve an optimum firing result.
- Apply the mixed add-on material directly on the unfired Glaze Paste and/or Shades and Stains and fire.
- Conduct the crystallization if Add-On is applied on the "blue" partially crystallized restoration.
- Conduct the corrective firing if Add-On is applied on an already crystallized restoration.

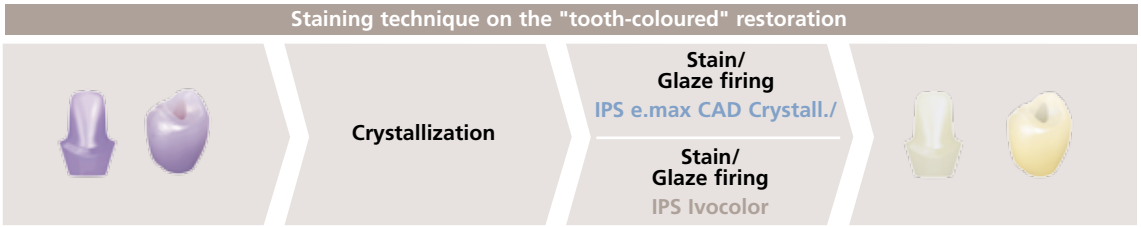
Mixing IPS e.max CAD Crystall/Add-On with IPS e.max CAD Crystall/Add-On Liquid to an easy-to-contour consistency.

Application of the mixed Add-On on the blue restoration before crystallization or on the crystallized restoration.

Firing parameters see page 64

Next working step … **Permanent cementation Ti base / ceramic structure page 46**

Staining technique on the "tooth-coloured" restoration



Crystallization without application of any materials; separate Stain/Glaze firing either with IPS e.max CAD Crystall./ or IPS Ivocolor materials.

Crystallization

The following steps must be observed:

- Use the **IPS e.max CAD Crystallization Pin XS** for the crystallization of the ceramic structure.
- Fill the interface of the ceramic structure with either IPS Object Fix Putty or Flow auxiliary firing paste. **Immediately reseal the IPS Object Fix Putty/Flow syringe after extruding the material.**
- Slightly press the **IPS e.max CAD Crystallization Pin XS** into the IPS Object Fix Putty/Flow. **Important: Do not press the pin in too deep to make sure that it does not touch the walls. This may lead to cracks in the ceramic structure.**
- Smooth out displaced auxiliary firing paste using a plastic spatula so that the pin is securely in place.
- Prevent contamination of the outer restoration surface. Clean off contamination with a brush dampened with water and dry.
- Place the ceramic structure in the centre of the IPS e.max CAD Crystallization Tray.

Observe the firing parameters for IPS e.max CAD MO and IPS e.max CAD LT.

Conduct the **crystallization** on the IPS e.max CAD Crystallization Tray using the stipulated firing parameters. **Firing parameters see page 64**

If a restoration made of IPS e.max CAD MO and one made of IPS e.max CAD LT are to be crystallized in the same firing cycle, the firing parameters for IPS e.max CAD MO must be used!

Use the IPS e.max CAD Crystallization Pin XS for the crystallization of the ceramic structure.

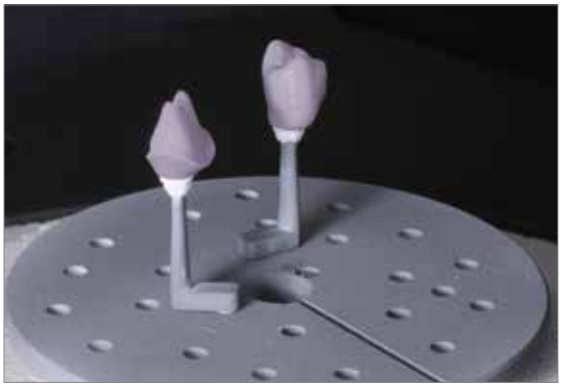
Fill the interface of the ceramic structure with either IPS Object Fix Putty or Flow firing paste.

Important: – Press the IPS e.max CAD Crystallization Pin XS only slightly into the IPS Object Fix Putty/Flow so that it does not touch **the walls** of the ceramic structure.

Incorrect: Pin pressed in too deep. Pin touches the ceramic structure. This may lead to cracks in the ceramic structure.

Smooth out displaced auxiliary firing paste with a plastic spatula from the margin towards the support pin so that the pin is secured in the paste.

Clean off any possible residue adhering to the outer surface surface with a brush dampened with water and dry



Conduct the crystallization using the stipulated firing parameters. Observe the **firing parameters** for **IPS e.max CAD MO** and **IPS e.max CAD LT**.

Crystallized ceramic structures.

- Remove ceramic structures from the furnace after completion of the firing cycle (wait for the acoustic signal of the furnace).
- Allow the objects to cool to room temperature in a place protected from draft.
- Do not touch the hot objects with metal tongs.
- Remove the ceramic structure from the IPS e.max CAD Crystallization Pin.
- Remove any residue with ultrasound in a water bath and/or with the steam jet.
- Do **not** remove residue with Al_2O_3 or glass polishing beads.
- Place the ceramic structure on the Ti base and check the fit.
- **If grinding adjustments are required, make sure that the ceramic does not overheat.**
- After carrying out the adjustments, polish the adjusted areas to a high gloss.

next working step, either...

Stain/Glaze firing with IPS e.max CAD Crystall./; page 36

Stain/Glaze firing with IPS Ivocolor; page 40

Stain/Glaze firing with IPS e.max CAD Crystall./...

The following paragraphs will explain the steps of staining and glazing with IPS e.max CAD Crystall./Shades, Stains and Glaze.

If hybrid abutments are fabricated, only the area of the emergence profile is characterized with IPS e.max CAD Crystall./Shades, Stains and Glaze

If hybrid abutment crowns are fabricated, the entire outer surface may be individually characterized.

Required materials

– IPS e.max CAD Crystall./Shades are ready-to-use "Dentin" stains in syringes.

– IPS e.max CAD Crystall./Stains are ready-to-use intensive stains in syringes.

– IPS e.max CAD Crystall./Glaze Paste is a ready-to-use glazing paste.
– IPS e.max CAD Crystall./Glaze Liquid is a special liquid for mixing with Shades, Stains and Glaze.

The IPS e.max CAD Crystall./**Glaze Spray** is **not** recommended for glazing IPS e.max CAD Abutment Solutions, as it requires very targeted application. The glazing material must not touch the bonding surface to the Ti base or the screw channel, as this may compromise the accuracy of fit.

Please observe the following procedure for the Stain/Glaze firing:
- Extrude the ready-to-use IPS e.max CAD Crystall./Glaze Paste from the syringe and mix.
- If a slight thinning is desired, the ready-to-use glaze may be mixed with a small amount of IPS e.max CAD Crystall./ Glaze Liquid.

- The glazing material must not touch the bonding surface to the Ti base or the screw channel, as this may compromise the accuracy of fit. Check the interface before firing and carefully remove any contamination.
- On the hybrid abutment, do not apply any materials to the bonding surface to the crown, as this may compromise the fit of the crown.

- Apply IPS e.max CAD Crystall./Glaze Paste evenly on the areas to be glazed using a small brush. Do not apply the glaze layer too thickly. Avoid "pooling", especially on the occlusal surface of the hybrid abutment crown.
- Too thin a glaze layer may lead to an unsatisfactory gloss.
- Apply characterizations with IPS e.max CAD Crystall./Shades and/or IPS e.max CAD Crystall./Stains. For that purpose, extrude the Shades and Stains from the syringe and mix. If necessary, slightly thin them using IPS e.max CAD Crystall./ Glaze Liquid. However, the consistency should still remain pasty.
- Apply mixed Shades and Stains directly into the unfired glaze layer using a fine brush. More intensive shades are achieved by several staining procedures and repeated firing, not by applying thicker layers.
- To imitate the incisal area and translucency of the abutment crown in the incisal and occlusal third, IPS e.max CAD Crystall./Shades Incisal may be used. The cusps and fissures can be individualized using Stains.

After glazing and staining, the Stain/Glaze firing (corrective firing) is conducted in a compatible ceramic furnace (e.g. Programat CS3 or Programat P510). When placing the objects into the furnace and setting the firing parameters, observe the following points:

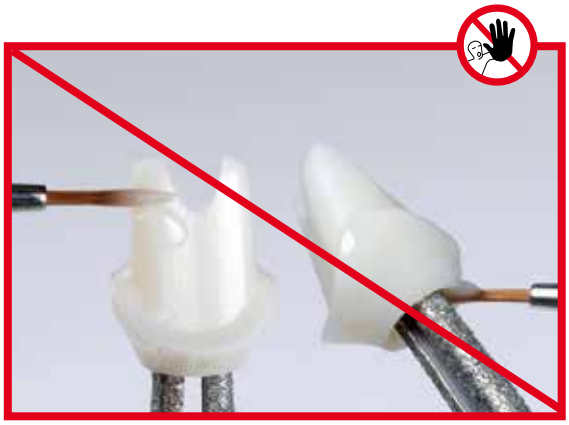
- Place the restoration in the centre of the IPS e.max CAD Crystallization Tray.
- A maximum of 6 units can be positioned on the firing tray for the firing with IPS e.max CAD Crystall./Glaze Paste.

Observe the firing parameters for IPS e.max CAD MO and IPS e.max CAD LT.

Conduct the **Corrective/Stain/Glaze firing** on the IPS e.max CAD Crystallization Tray using the stipulated firing parameters. **Firing parameters see page 64.**

Extrude IPS e.max CAD Crystall./Glaze Paste from the syringe and mix. If required, thin with IPS e.max CADCrystall./Glaze Liquid

Apply IPS e.max CAD Crystall./Glaze Paste evenly on the emergence profile of the hybrid abutment or the outer surface of the hybrid abutment crown.



Important: The glaze material must not touch the bonding surface to the Ti base nor the screw channel or the bonding surface to the crown, as this may compromise the accuracy of fit.

Characterizing the emergence profile with Shades

Enhancing the chroma

Apply IPS e.max CAD Crystall./Shade Incisal to imitate the incisal area.

Conduct the corrective/stain/glaze firing on the IPS e.max CAD Crystallization Tray using the stipulated firing parameters.

Optional

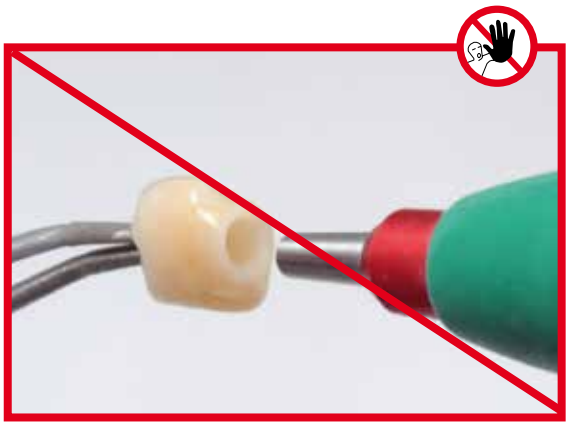
Corrective firing

- If adjustments are required, another corrective firing using IPS e.max CAD Crystall./Shades and Stains and Glaze can be conducted. Conduct the corrective firing also on the IPS e.max CAD Crystallization Tray.
- For minor shape adjustments (e.g. proximal contact points), IPS e.max CAD Crystall./Add-On is available. The adjustments may be made with both the Crystallization/Glaze and Corrective firing.
- The detailed procedure is described on page 33.

Once the IPS e.max CAD ceramic structures have cooled to room temperature, proceed with the following steps:
- Remove the ceramic structure from the IPS e.max CAD Crystallization Pin XS.
- Remove any residue with ultrasound in a water bath and/or with the steam jet.
- Do **not** remove residue with Al_2O_3 or glass polishing beads.
- Place the ceramic structure on the Ti base and check the fit.
- If grinding adjustments are required, make sure that the ceramic does not overheat.
- If grinding was necessary, polish these areas to a high gloss manually.

Remove the ceramic structure from the IPS e.max CAD Crystallization Pin XS.

Remove any residue with ultrasound in a water bath or with the steam jet.



Do **not** remove residue with Al_2O_3 or glass polishing beads.

Glazed and characterized ceramic structures
(hybrid abutment and/or hybrid abutment crown)

Next working step … **Permanent cementation Ti base / ceramic structure page 46**

Stain and Glaze firing with IPS Ivocolor

The following paragraphs will explain the steps of staining and glazing with **IPS Ivocolor**.

If hybrid abutments are fabricated, only the area of the emergence profile is characterized with IPS Ivocolor Shades, Essences and Glaze.

If hybrid abutment crowns are fabricated, the entire outer surface may be individually characterized with IPS Ivocolor Shades, Essences, and Glaze.

Required materials

- **IPS Ivocolor Essences** are intensively shaded stains in powder form.
- **IPS Ivocolor Shades** are ready-to-use stains in syringes.
- **IPS Ivocolor Mixing Liquids** (allround, longlife) to mix the materials in powder form (Essences, Glaze), as well as to thin paste materials (Shades, Glaze).
- **IPS Ivocolor Essence Fluid** to mix the Essences in powder form to a pasty consistency.

IPS Ivocolor Essence Fluid is exclusively indicated for mixing with the powder Essences.

IPS e.max CAD Crystall./Shades, Stains, Glaze and IPS Ivocolor Shades, Essence, Glaze should not be mixed with one another, nor applied one after the other!

The following procedure must be observed:

- Clean the ceramic structure with the steam jet to remove any dirt and grease residues. Avoid any contamination after cleaning.
- To improve wettability, a small amount of IPS Ivocolor Mixing Liquid can be applied to the area to be characterized.
- Mix the pastes or powders with the IPS Ivocolor Mixing Liquid allround or longlife to the desired consistency.
- More intensive shades are achieved by several staining procedures and repeated firing, not by applying thicker layers.
- To imitate the incisal area and translucency of the hybrid abutment crown in the incisal and occlusal third, IPS Ivocolor Shade Incisal may be used. The cusps and fissures can be individualized using Essences.
- If hybrid abutments are fabricated, only the area of the emergence profile is characterized with IPS Ivocolor Shades and Essences.
- Secure the ceramic structure on the firing pin of the honey-comb tray with a little IPS Object Fix Putty or Flow for firing.

The **stains must not** touch the bonding surface of the Ti base or the screw channel, as this may compromise the accuracy of fit. Check the interface before firing and carefully remove any contamination. On the hybrid abutment, do not apply any materials to the bonding surface to the crown, as this may compromise the fit of the crown.

Conduct the **Stain/Glaze firing for IPS Ivocolor** on a honey-comb firing tray using the stipulated firing parameters. **Firing parameters see page 64**

Apply IPS Ivocolor Shade Incisal to imitate the incisal area.

Enhancing the chroma of the buccal surface

Individual characterization of the emergence profile with IPS Ivocolor Essences

Conduct the Stain and Characterization firing on a honey-comb firing tray.

- Remove restoration from the furnace after completion of the firing cycle (wait for the acoustic signal of the furnace).
- Allow the objects to cool to room temperature in a place protected from draft.
- Do not touch the hot objects with metal tongs.

Additional Stain firings can be conducted with the same firing parameters.

Glaze firing

Glaze firing is conducted with powder or paste glaze. On abutments, only the emergence profile is glazed. On hybrid abutment crowns, glaze is applied to the entire outer surface.

Required materials

- **IPS Ivocolor Glaze Paste/FLUO, Glaze Powder/FLUO** are glazing material in paste or powder form with or without fluorescence.
- **IPS Ivocolor Mixing Liquids** (allround, longlife) to mix the materials in powder form (Essences, Glaze), as well as to thin paste materials (Shades, Glaze).

IPS e.max CAD Crystall./Shades, Stains, Glaze and IPS Ivocolor Shades, Essence, Glaze must not be mixed with one another, nor applied one after the other!

The following procedure is recommended:

- For easier handling, the ceramic structure can be positioned on the Ti base for glazing. For that purpose, secure Ti base on a model analog.
- Mix the glazing material (IPS Ivocolor Glaze Paste or Powder) with the IPS Ivocolor Mixing Liquid allround or longlife to the desired consistency.
- Apply an even layer of glazing material covering all areas that are to be glazed.
- The degree of gloss of the glazed surface is controlled via the consistency of the glazing material and the applied quantity, not by means of the firing temperature. For a higher degree of gloss, the glazing material has to be applied in a correspondingly thicker layer.
- If required, the fluorescence may be increased by applying the fluorescing glazing material (Paste FLUO or Powder FLUO).

The glazing material **must not touch the bonding surface** of the Ti base or the screw channel, as this may compromise the accuracy of fit. Check the interface before firing and carefully remove any contamination.
On the abutment, do not apply any glaze to the bonding surface to the crown, as this might compromise the fit of the crown.

Conduct the **Stain/Glaze firing for IPS Ivocolor** on a honey-comb firing tray using the stipulated firing parameters. **Firing parameters see page 64**

Apply an even layer of glaze material to the emergence profile of the hybrid abutment. Make sure that no glazing material enters the screw channel.

Apply the glazing material evenly on the outer surface of the hybrid abutment crown. Make sure that no glazing material enters the screw channel.

Make sure that no glaze material is present on the interface of the hybrid abutment and hybrid abutment crown prior to the firing cycle. If necessary, carefully remove the glazing material.

Conduct the Stain/Glaze firing on a honey-comb firing tray with the corresponding parameters.

- Remove restoration from the furnace after completion of the firing cycle (wait for the acoustic signal of the furnace).
- Allow the objects to cool to room temperature in a place protected from draft.
- Do not touch the hot objects with metal tongs.
- Additional Glaze firing cycles can be conducted with the same firing parameters.

Optional

Shape adjustments of IPS e.max Ceram Add-On

Use IPS e.max Ceram Add-On Dentin and/or Incisal for shape adjustments after Glaze firing. Please observe the following procedure for processing:

- Mix IPS e.max Ceram Add-On Dentin or Incisal with IPS Build-Up Liquid soft or allround and apply on the corresponding areas.
- Fire with the stipulated parameters for the "Add-On after Glaze firing". Observe long-term cooling!
- If necessary, polish the adjusted areas to a high gloss after firing.

Firing parameters see page 64

Next working step … **Permanent cementation Ti base / ceramic structure page 46**

Crown on an IPS e.max CAD Hybrid Abutment

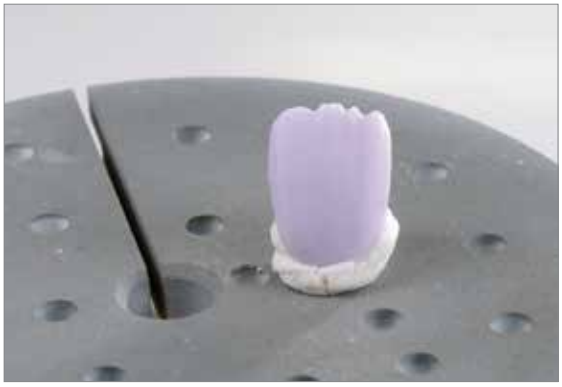
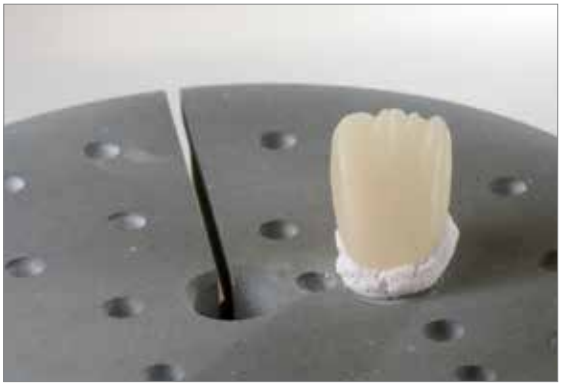
The crown on the IPS e.max Hybrid Abutment can be completed using either the staining technique or the cut-back technique. To characterize and glaze, either the IPS e.max CAD Crystall./ materials or the IPS Ivocolor materials are used. The reduced areas (cut-back technique) are built-up with IPS e.max Ceram layering materials.

Processing technique	 Staining Technique	 Cut-Back Technique
Veneering and build-up	–	IPS e.max Ceram
Staining and glazing of the tooth-coloured restorations	IPS e.max CAD Crystall./ materials IPS Ivocolor	IPS Ivocolor

Basically, the procedure for completing a crown is the same as that for a crown on a prepared tooth.
For detailed information about the procedure, please refer to the IPS e.max CAD Monolithic Solutions labside/chairside Instructions for Use.

Example: IPS e.max CAD crown – Cut-back technique – IPS e.max Ceram


Partially reduced IPS e.max CAD restorations fitted on the model. Always observe minimum thicknesses!

For crystallization, place the partially reduced IPS e.max CAD restorations directly on the IPS e.max CAD Crystallization Tray using IPS Object Fix Putty or Flow.


Conduct the Wash firing using e.g. IPS Ivocolor Glaze, Shades and Essences.

Completion of the anatomical shape using IPS e.max Ceram Incisal and Opal materials.

Finish the restoration with diamond ginding instruments and design a true-to-nature shape and surface structure.

IPS e.max CAD crown after Glaze firing (partially reduced and veneered with IPS e.max Ceram) on an IPS e.max CAD hybrid abutment.

Permanent cementation of Ti base / ceramic structure

Careful preparation of the bonding surface is a prerequisite for an optimum adhesive cementation between the Ti base and the ceramic structure. Observe the following procedure. It is the same for hybrid abutments and hybrid abutment crowns.

Required materials
- IPS Ceramic Etching Gel *or* Monobond Etch & Prime®
- Monobond® Plus
- Multilink® Hybrid Abutment
- Glycerine gel (e.g. Liquid Strip)

	IPS e.max CAD ceramic structure (LS_2)		Ti base
Blasting	–		According to the instructions of the manufacturer
Conditioning	**Option 1**	**Option 2**	
Etching	Bonding area to the base with IPS® Ceramic Etching Gel for 20 s	Agitate Monobond Etch & Prime® for 20 seconds into the bonding surface to the Ti base and allow it to react for another 40 seconds.	–
Silanizing	The bonding area with Monobond® Plus for 60 s		The bonding area with Monobond® Plus for 60 s
Adhesive cementation	Multilink® Hybrid Abutment		
Covering the cementation joint	Glycerine gel, e.g. Liquid Strip		
Curing	7 minutes auto-polymerization		
Polishing the cementation joint	Conventional polishers for ceramic/composite resin		

Preparation of the Ti base

The following procedure should be observed in the preparation of the Ti base for the cementation with the ceramic structure:
- The Ti base should be prepared according to manufacturer's instructions.
- The Ti base is cleaned in an ultrasonic bath or with a steam cleaner and then dried with compressed air.
- Screw Ti base onto a model analog.
- Place the ceramic structure on the Ti base and mark the relative position of the components with a waterproof pen. This facilitates locating the correct position when the parts are assembled at a later stage.
- The emergence profile of the Ti base must not be blasted or modified in any way.
- **If the manufacturer recommends that the bonding surface of the Ti base be blasted, the following procedure should be observed**:
  - Hard modelling wax is applied to protect the emergence profile, since this type of material is easy to remove later on.
  - The bonding area is carefully blasted according to the instructions of the manufacturer.
  - Remove silicone.
  - An instrument and a steam cleaner are used for cleaning. It is important to remove all the wax meticulously.
  - After the bonding surface has been cleaned, it must not be contaminated under any circumstances, as this would impair the bond.
- Monobond Plus is applied on the clean bonding surface and allowed to react for 60 s. After the reaction time, any remaining residue is dried with compressed air which is free from water and oil.
  Important: Monobond Etch & Prime is exclusively indicated for the conditioning of IPS e.max CAD ceramic structures and <u>must not</u> be applied to the Ti base.
- The screw channel is sealed with a foam pellet or wax. The bonding surface must not be contaminated in the process.

Screw Ti base onto a model analog. The relative position to the ceramic structure is marked with a waterproof pen.

Optional: Wax is applied in order to protect the emergence profile. In addition, the screw channel is sealed with wax.

Optional: The bonding surface can be carefully blasted **according to the instructions of the manufacturer.**

Optional: Cleaning with an instrument and a steam cleaner. It is important to remove all the wax meticulously.

Monobond Plus is applied to the clean bonding surface and allowed to react for 60 s. After the reaction time, any remaining residue is dried with compressed air which is free from water and oil.

Important: Monobond Etch & Prime must **not** be applied on the Ti base.

The screw channel is sealed with a foam pellet or wax.
The bonding surface must not be contaminated in the process.

Preparing the ceramic structure

To prepare the ceramic structure for the cementation to the Ti base, you can choose from the following two options:

Option 1 – Conditioning oft the bonding surfaces with **IPS Ceramic Etching Gel** and **Monobond Plus**
Option 2 – Conditioning of the bonding surfaces with **Monobond Etch & Prime**

For **Option 1**, observe the following procedure:
- The ceramic structure must not be blasted in preparation for the cementation.
- The ceramic structure is cleaned in an ultrasonic bath or with a steam cleaner and subsequently blown dry with water- and oil-free air.
- After cleaning, any contamination of the bonding surface must be prevented, since contaminations negatively influence the bond.
- Wax can be applied to protect the outer surfaces or the glazed areas.
- The bonding surface is etched with 5% hydrofluoric acid gel (IPS Ceramic Etching Gel) for 20 s.
- Subsequently, the bonding surface is thoroughly rinsed under running water and dried with water- and oil-free air.
- Apply Monobond Plus on the cleaned bonding surface and allow to react for 60 seconds. After the reaction time, dry the remaining residue with water- and oil-free air.

Do **not** blast the ceramic structure.

Etch with IPS Ceramic Etching Gel for 20 seconds. Subsequently, the restoration is rinsed with water and blown dry.

Monobond Plus is allowed to react for 60 s and excess is blown dry.

For **Option 2**, observe the following procedure:
- The ceramic structure must not be blasted in preparation for the cementation.
- The ceramic structure is cleaned in an ultrasonic bath or with a steam cleaner and subsequently blown dry with water- and oil-free air.
- After cleaning, any contamination of the bonding surface must be prevented, since contaminations negatively influence the bond.
- Wax can be applied to protect the outer surfaces or the glazed areas.
- Apply Monobond Etch & Prime on the adhesive surface using a Microbrush and agitate into the surface for 20 seconds. After that, allow to react for another 40 seconds.
- Then thoroughly rinse off Monobond Etch & Prime with water and dry the restoration with a strong jet of water- and oil-free air for approximately 10 seconds.

Do **not** blast the ceramic structure.

Agitate Monobond Etch & Prime for 20 seconds and then allow it to react for another 40 seconds. Subsequently, the restoration is rinsed with water and blown dry.

Cementation with Multilink® Hybrid Abutment

The following instructions must be observed for the cementation procedure:

- The cleaned and conditioned components (ceramic structure, base) are laid out ready for cementation.
- **The subsequent cementation procedure must be carried out quickly and without interruption. The working time of Multilink Hybrid Abutment is approximately 2 min at 23 °C (± 1 °C) or 73 °F (± 1.8 °F).**
- As a general rule, a new mixing tip is attached to the Multilink Hybrid Abutment syringe prior to each use.
- Apply A thin layer of Multilink Hybrid Abutment directly from the mixing syringe to the bonding surface of the Ti base and **the bonding surface of the ceramic structure**.
- The mixing tip is left on the Multilink Hybrid Abutment syringe until the next use. The remaining cement polymerizes in the tip and functions as a seal.
- The ceramic structure is placed on the base in such a way that the position markings are aligned.
- Press the parts lightly and evenly together and verify the correct relative position of the components (transition Ti base/ ceramic structure).
- Subsequently, the parts are tightly pressed together for 5 s.
- Excess in the screw channel is carefully removed, e.g. with a Microbrush or brush, using rotary movements.

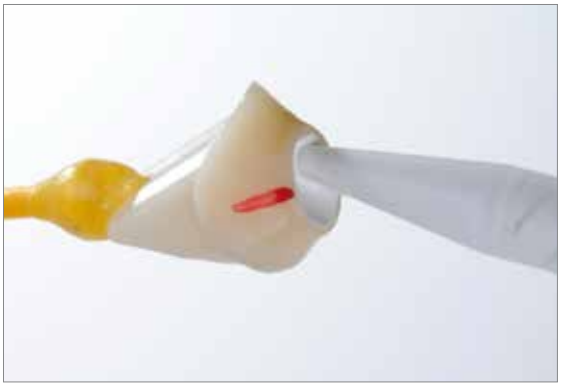
Remove excess circumferential composite only after the initial setting phase (2–3 minutes after mixing) with a suitable dental-lab instrument (e.g. Le Cron). The components are held in place with light pressure in the process.

- Apply a glycerine gel (e.g. Liquid Strip) to the cementation joint to prevent the formation of an inhibited layer. The gel must be left on the cementation join until the end of the setting time.
- Next, the luting composite is completely auto-polymerized within 7 min.
- **Important: The components must not be moved until Multilink Hybrid Abutment has completely cured. They can be held immobile with e.g. diamond-coated tweezers.**
- After the completion of auto-polymerization, the glycerine gel is rinsed off with water.
- **The cementation joint should be cautiously polished with rubber polishers at a low speed (< 5,000 rpm) to avoid overheating**.
- Any cement residue left in the screw channel is removed with suitable rotating instruments.
- The restoration is steam cleaned.

Keep the cleaned and conditioned components that are to be cemented at hand.

A new mixing tip is attached to the Multilink Hybrid Abutment prior to each use. Attach the Multilink Hybrid Abutment mixing syringe.

A thin layer of Multilink Hybrid Abutment is directly applied from the mixing syringe to the bonding surface of the base.



A thin layer of Multilink Hybrid Abutment is directly applied from the mixing syringe on the bonding surface of the ceramic structure.

The ceramic structure is placed on the base in such a way that the position markings are aligned. The components are joined using even and light pressure and the relative position of the components is checked (transition base/ceramic structure).

Subsequently, the components are tightly pressed together for 5 s.

Excess in the screw channel is carefully removed, e.g. with a Microbrush or brush, using rotary movements.

Important: **Excess must not be removed** before **curing has started, i.e. 2–3 minutes after mixing**. The components are held in place with light pressure in the process.

Glycerine gel (e.g. Liquid Strip) is applied on the cementation join to prevent the formation of an inhibition layer.

The luting composite auto-polymerizes within 7 min.
Important: The components must not be moved until auto-polymerization is completed. The components must be immobilized during this time.

After the completion of auto-polymerization, the glycerine gel is rinsed off with water.

The cementation joint is cautiously polished with rubber polishers at low speed (< 5,000 rpm), to avoid overheating.

Any remaining cement residue in the screw channel is removed with suitable rotating instruments. The Ti base must no be damaged.

Completed hybrid abutment and hybrid abutment crown after cementation

IPS e.max CAD Abutment Solutions

Seating and Aftercare

Sterilization

Hybrid abutments or hybrid abutment crowns must be disinfected before being incorporated in the oral cavity. The local statutory provisions and hygiene standards that apply to dental practices have to be observed.

Steam sterilization can be performed under 3x-fractioned prevacuum and observing the following parameters: Sterilization time 3 min, steam temperature 132°C; this corresponds to a half-cycle exposure time of 2 min. The hybrid abutment or the hybrid abutment crowns is to be used immediately. No storage after sterilization!

The user is responsible for the sterility of the hybrid abutment or the hybrid abutment crown. It must be ensured that the sterilization is only performed using suitable devices and materials, as well as product-specific, validated methods. The devices used must be properly maintained and regularly serviced. It is the duty of the IPS e.max CAD Abutment Solutions users to inform their dentists that the restorations require sterilization before being seated in the patient's oral cavity.

Intraoral preparation

Please observe the following procedure to prepare for the permanent cementation of the implant-retained restoration:
- Remove the temporary restoration.
- Clean the implant site
- Check the periimplant tissue (emergence profile)

Seating the hybrid abutment and crown

Preparing/conditioning the hybrid abutment and the corresponding crown

Conditioning of the ceramic surface, i.e. the bonding surface, in preparation for cementation is critical for generating a sound bond between the cementation material and the all-ceramic materials.

There are two options for the preparation of the ceramic structures:

Option 1 – Conditioning of the bonding surfaces with **IPS Ceramic Etching Gel** and **Monobond Plus**
Option 2 – Conditioning of the bonding surfaces with **Monobond Etch & Prime**

For **Option 1**, observe the following procedure:
- The IPS e.max CAD hybrid abutment or IPS e.max CAD crown must **not** be blasted with Al_2O_3 or glass polishing beads before being seated.
- Ideally, the clinical try-in is conducted before etching to prevent contamination of the bonding surface.
- The hybrid abutment and crown are thoroughly cleaned with water and subsequently blown dry.
- The bonding surface is etched with 5% hydrofluoric acid gel (IPS Ceramic Etching Gel) for 20 s. The etching gel must not come into contact with the emergence profile or the outer side of the crown. **Important: Do not use the IPS Ceramic Etching Gel intraorally**.
- Thoroughly rinse off with water and blow dry with water- and oil-free air.
- If an adhesive or self-adhesive cementation protocol is used, Monobond Plus is applied to the clean bonding surfaces and allowed to react for 60 s. After this reaction time, any residue is dispersed with air that is free of water and oil.

The IPS e.max CAD ceramic structures **must not** be blasted in preparation for cementation.

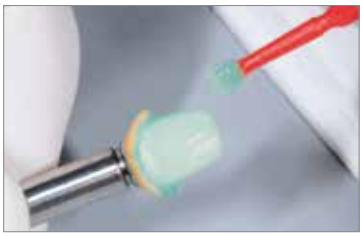
The bonding surfaces are etched with IPS Ceramic Etching Gel for 20 seconds and subsequently cleaned.

Monbond Plus is applied to the bonding surfaces, allowed to react for 60 s. Excess is dispersed with air.

For **Option 2** , observe the following procedure:

- The IPS e.max CAD hybrid abutment or IPS e.max CAD crown must not be blasted with Al_2O_3 or glass polishing beads before being seated.
- Perform the clinical try-in before conditioning.
- The hybrid abutment and crown are thoroughly cleaned with water and subsequently blown dry.
- Apply Monobond Etch & Prime on the adhesive surface using a Microbrush and agitate into the surface for 20 seconds. After that, allow to react for another 40 seconds. **Important: Do not use Monobond Etch & Prime intraorally**.
- Then thoroughly rinse off Monobond Etch & Prime with water and dry the restoration with a strong jet of water- and oil-free air for approximately 10 seconds.

The IPS e.max CAD ceramic structures **must not** be blasted.



Agitate Monobond Etch & Prime® for 20 seconds into the bonding surfaces and allow it to react for another 40 seconds. Subsequently, the restoration is rinsed with water and blown dry.

Cementing the hybrid abutment and separate crown

Temporary insertion of the IPS e.max CAD crown on the IPS e.max CAD hybrid abutment is contraindicated!

To incorporate the hybrid abutment and the crown, the following working steps have to be observed, as well as the instructions for use of the selected cementation material.

SpeedCEM® is recommended for the seating of IPS e.max CAD crown on the IPS e.max hybrid abutment.

- Do not use phenolic mouth washes, as such products negatively influence the bond between the ceramic and the composite.
- Insert the hybrid abutment intraorally into the implant.
- Manually screw in the matching implant screw.
- Tighten the implant screw with a torque wrench (observe the manufacturer's instructions).
- Insert a cotton or foam pellet into the screw channel.
- Seal the screw channel with a temporary composite (e.g. Telio® CS Inlay). This serves to ensure access to the screw at a later stage.
- Check the bonding area for contamination/moisture and clean or dry with an air syringe, if necessary.
- Apply the luting material, **e.g. SpeedCEM**, into the conditioned crown.
- Place the crown onto the hybrid abutment and secure in place in the final position.
- Conduct the pre-polymerization using the four-quarter technique.
- Remove excess luting material.
- Cover the cementation joint with glycerine gel (e.g. Liquid Strip).
- Polymerize with an LED curing light (e.g. Bluephase®).
- Rinse off the glycerine gel with water.
- Check the occlusion and articulation and make adjustments, if necessary. If adjustments are made to the restoration by grinding, these areas must subsequently be polished to a high gloss, e.g. using OptraFine.
- Polish restoration margins and the cementation joint with silicone polishers (e.g. Astropol®, OptraFine).
- Apply Cervitec® Plus (protective varnish) in the area of the gingival margin.

Insert the hybrid abutment intraorally into the implant.

Manually screw in the matching implant screw.

Tighten the implant screw with a torque wrench (observe the instructions of the manufacturer).

Seal the screw channel, for instance with a cotton or foam pellet and a temporary composite material.

Apply the luting material, e.g. SpeedCEM, into the conditioned crown.

Place the crown onto the hybrid abutment and secure in place.

Conduct the pre-polymerization using the four-quarter technique.

Remove excess luting material.

Cover the restoration margin with glycerine gel (e.g. Liquid Strip).

Polymerize with an LED curing light (e.g. Bluephase).

Rinse off the glycerine gel with water.

Check the occlusion and articulation and make adjustments, if necessary.

Polish restoration margins and the cementation joint with polishers (e.g. OptraPol, OptraFine).

Completed IPS e.max CAD hybrid abutment and crown.

Cementing the hybrid abutment crown

Preparing/conditioning the hybrid abutment crown

To prepare for the intraoral sealing of the screw channel, you can choose from two options:

Option 1 – Conditioning of the bonding surfaces with **IPS Ceramic Etching Gel** and **Monobond Plus**
Option 2 – Conditioning of the bonding surfaces with **Monobond Etch & Prime**

For **Option 1**, observe the following procedure:

- As a general rule, do **not** blast IPS e.max CAD hybrid abutment crowns with Al_2O_3 or glass polishing beads.
- Thoroughly clean the hybrid abutment crown with water and blow dry.
- Etch the screw channel from the occlusal side with 5% hydrofluoric acid gel (IPS Ceramic Etching Gel) for 20 seconds. Make sure that no etching gel comes into contact with the occlusal surface. **Important: Do not use the IPS Ceramic Etching Gel intraorally.**
- Thoroughly rinse off with water and blow dry with water- and oil-free air.
- Apply Monobond Plus to the etched and cleaned surface in the screw channel, allow to react for 60 seconds and then disperse excess with water- and oil-free air.

Do **not** blast IPS e.max CAD ceramic structures.

Etch the screw channel with IPS Ceramic Etching Gel for 20 s and subsequently clean.

Apply Monobond Plus, allow it to react for 60 s and disperse excess.

For **Option 2**, observe the following procedure:

- As a general rule, do not blast IPS e.max CAD hybrid abutment crowns with Al_2O_3 or glass polishing beads.
- Thoroughly rinse the hybrid abutment crown with water and blow dry with water- and oil-free air.
- Apply Monobond Etch & Prime in the screw channel from an occlusal direction using a Microbrush and agitate into the surface for 20 seconds. After that, allow to react for another 40 seconds. Make sure that no gel comes into contact with the occlusal surface. **Important: Do not use Monobond Etch & Prime intraorally.**
- Then thoroughly rinse off Monobond Etch & Prime with water and dry the restoration with a strong jet of water- and oil-free air for approximately 10 seconds.

Do **not** blast IPS e.max CAD ceramic structures.

Agitate Monobond Etch & Prime® for 20 seconds into the screw channel and allow it to react for another 40 seconds. Subsequently, the restoration is rinsed with water and blown dry.

Cementing the hybrid abutment crown

For the permanent seating of the hybrid abutment crown, please observe the following working steps:

- Do not use phenolic mouth washes, as such products negatively influence the bond between the ceramic and the composite.
- Insert the hybrid abutment crown intraorally into the implant.
- Manually screw in the matching implant screw.
- Tighten the implant screw with a torque wrench (observe the instructions of the manufacturer).
- Check the screw channel for contamination/moisture.
- Insert a cotton or foam pellet into the screw channel.
- Apply the bonding agent, followed by polymerization.
- Seal the screw channel with a composite material (e.g. Tetric EvoCeram) in the appropriate shade.
- Polymerize with an LED curing light (e.g. Bluephase).
- Check the occlusion/articulation after polymerization and correct possible rough spots with suitable fine-grain diamond burs.
- Polish to a high gloss with silicone polishers (e.g. OptraPol/OptraFine).

Insert the hybrid abutment crown intraorally into the implant.

Manually screw in the matching implant screw.

Tighten the implant screw with a torque wrench (observe the instructions of the manufacturer).

Seal the screw channel with a composite material (e.g. Tetric EvoCeram) in the appropriate shade.

Polymerize with an LED curing light (e.g. Bluephase).

After polymerization, check the occlusion/articulation and correct possible rough spots with suitable finishers or fine diamonds.

Polish to a high gloss using silicone polishers (e.g. Astropol P, Astropol HP or Astrobrush).

Completed IPS e.max CAD hybrid abutment crown

Care Notes – Implant Care

Implant Care comprises a range of coordinated products for the professional care of patients during the various phases of implant treatment and lifelong aftercare. Products for professional tooth cleaning and bacterial control contribute to the long-term quality assurance of implant-supported restorations. Structural elements, peri-implant tissue, natural teeth, dental restorations, gingiva and the mucosa are treated in an optimum way with regard to function and esthetics.

IPS e.max CAD Abutment Solutions

General Information

Frequently Asked Question

In addition to the desired tooth shade, why should the root shade also be defined/ determined upon shade determination?

IPS e.max CAD Abutment Solutions allow you to fabricate restorations with a lifelike appearance both in the visible area and the area below the gingiva (root). By defining the root shade, a highly esthetic outcome can be achieved especially in the case of receding gingiva.

Is it possible to fabricate an abutment or an abutment crown with IPS e.max CAD (LS_2) without using a Ti base?

No! *For this indication, IPS e.max CAD needs the support provided by the Ti base. In addition, the Ti base allows an optimum (industrially fabricated) fit to the implant to be achieved.*

Which Ti bases can be used for the fabrication of IPS e.max CAD Abutment Solutions?

Only Ti bases of authorized CAD/CAM systems may be used.
Further information about the CAD/CAM cooperation systems are available on the Internet rom www.ivoclarvivadent.com.

Is it permissible to modify the selected Ti base?

The Ti base must not be adjusted by grinding, as this would compromise the fit of the IPS e.max CAD ceramic structure.
The instructions of the manufacturer regarding the preparations for permanent cementation must be observed.

Is a hybrid abutment crown indicated in the anterior region?

This indication depends on the position and inclination of the implant. If the opening of the screw channel is located on the oral surface, a hybrid abutment crown may be fabricated in the anterior region.

May a hybrid abutment crown be cut-back and subsequently supplemented with IPS e.max Ceram layering materials?

No. For implant-retained restorations, it is recommended to fabricate monolithic restorations (without veneer). In this way, chipping of the layering ceramic is prevented.

Do IPS e.max CAD ceramic structures have to be glazed in all cases?

No. High-gloss can also be achieved by a corresponding polishing procedure. The polishing technique (before crystallization) is preferably used for the emergence profile of the hybrid abutment. For the hybrid abutment crown, the application of glaze is recommended.

Is it possible to use an IPS e.max CAD hybrid abutment as an abutment for a bridge restoration?

No. Only single-tooth restorations may be fabricated.

Can different CAM units be used for milling the IPS e.max CAD ceramic structure (abutment) and the dedicated IPS e.max CAD crown?

If different CAM units are used, inaccuracies of fit may occur in unfavourable cases. Therefore, both IPS e.max CAD objects (abutment, crown) should be ideally milled in the same CAM unit.

Can a clinical try-in be conducted with the IPS e.max CAD Abutment Solutions? How are the ceramic structures prepared for this?

Yes. The clinical try-in may be performed either before or after crystallization of the IPS e.max CAD ceramic structures. The Ti base and IPS e.max CAD ceramic structure are temporarily joined in the laboratory by means of a silicone material, e.g. Virtual Extra Light Body Fast Set. This facilitates the intraoral handling during clinical try-in with the patient.

What must be observed for the clinical try-in of a crown on a hybrid abutment?

To check the occlusion/articulation and to make possible adjustments, the crown must be temporarily secured on the hybrid abutment with a silicone material, e.g. Virtual Extra Light Body Fast Set. The silicone material acts as a buffer and prevents chipping in the marginal area of the crown. Try-in pastes or Vaseline must not be used for functional checks.

Can a glaze spray be used for glazing IPS e.max CAD ceramic structures (e.g. IPS e.max CAD Crystall./Glaze Spray)?

We do not recommend using the Glaze Spray for indication hybrid abutment or hybrid abutment crown, as there is a risk that the bonding surface to the Ti base or the scew channel will be contaminated with glaze.

What material is used to permanently cement the IPS e.max CAD ceramic structures to the Ti base?

Only Multilink Hybrid Abutment is to be used for permanent cementation. This ensures a high-quality bond. Given the high opacity of the luting composite, complete optical masking of the Ti base is achieved and thus an excellent esthetic appearance ensured.

How is the Ti base prepared for the permanent cementation with Multilink Hybrid Abutment?

Provided it has been approved by the manufacturer, carefully blast the bonding area with Al_2O_3 at low pressure until an even mat surface has been achieved. After cleaning, the area is conditioned with Monobond Plus.

May Monobond Etch & Prime be used to condition the Ti base?

***No**. Monobond Etch & Prime is exclusively indicated for the conditioning of silicate ceramic surfaces. The use on Ti bases may cause damage to the titanium surface and compromise the adhesive bond with the ceramic structure.*

How is the screw channel of a hybrid abutment crown sealed after seating?

The screw channel is extraorally conditioned (etching, silanating). After the restoration has been intraorally screwed down on the implant, the screw channel is sealed with a restorative composite.

Can IPS Ivocolor also be used for the crystallization firing of IPS e.max CAD restorations?

IPS Ivocolor is not suitable for the staining and glazing of "blue" IPS e.max CAD restorations. After the crystallization firing, IPS Ivocolor can be used for the individualized characterization and glazing.

Material Selection Table

IPS e.max CAD hybrid abutment and IPS e.max CAD corresponding crown

The material is selected on the basis of the desired tooth shade (Bleach BL or A–D). Depending on the geometry of the hybrid abutment and the crown, shade adjustment by means of characterization with IPS e.max CAD Crystall./Shades, Stains, or IPS Ivocolor Shades and Essences may be necessary to achieve the desired shade.
The block recommendations for the hybrid abutment have been selected in such a way that the desired tooth shade is achieved in combination with the crown. In the "cervical area", it may be necessary to characterize the hybrid abutment according to the clinical situation.

		Bleach BL and A-D Shade Guide																			
Desired tooth shade		**BL1**	**BL2**	**BL3**	**BL4**	**A1**	**A2**	**A3**	**A3.5**	**A4**	**B1**	**B2**	**B3**	**B4**	**C1**	**C2**	**C3**	**C4**	**D2**	**D3**	**D4**
Material combination to achieve the tooth shade		Ti base																			
	Extraoral cementation IPS e.max CAD abutment / Ti base	Multilink Hybrid Abutment HO 0*																			
	IPS e.max CAD Ceramic Structure **optionally**	**MO 0**				**MO 1**		**MO 2**		**MO 3**	**MO 1**		**MO 3**		**MO 1**		**MO 4**			**MO 3**	
		MO 0	**LT BL2**	**LT BL2**	**LT BL2**	**LT A1**	**LT A2**	**LT A3**	**LT A3.5**	**LT A3.5**	**LT B1**	**LT B2**	**LT A3**	**LT A3.5**	**LT C1**	**LT C2**	**LT C2**	**LT C2**	**LT D2**	**LT A3**	**LT A3**
	Intraoral cementation Crown on Hybrid Abutment	adhesive, self-adhesive or conventional cementation e.g. SpeedCEM																			
	IPS e.max CAD crown	**LT BL1**	**LT BL2**	**LT BL3**	**LT BL4**	**LT A1**	**LT A2**	**LT A3**	**LT A3.5**	**LT A4**	**LT B1**	**LT B2**	**LT B3**	**LT B4**	**LT C1**	**LT C2**	**LT C3**	**LT C4**	**LT D2**	**LT D3**	**LT D4**

* the range of products may vary from country to country.

IPS e.max CAD hybrid abutment crown

The material is selected on the basis of the desired tooth shade (Bleach BL or A–D). Depending on the geometry of the hybrid abutment crown, shade adjustment by means of staining with IPS e.max CAD Crystall./Shades, Stains, or IPS Ivocolor Shades and Essences may be necessary to achieve the desired shade. In the "cervical area", it may be necessary to characterize the hybrid abutment crown according to the clinical situation.

		Bleach BL and A-D Shade Guide																			
Desired tooth shade		**BL1**	**BL2**	**BL3**	**BL4**	**A1**	**A2**	**A3**	**A3.5**	**A4**	**B1**	**B2**	**B3**	**B4**	**C1**	**C2**	**C3**	**C4**	**D2**	**D3**	**D4**
Material combination to achieve the tooth shade		Ti base																			
	Extraoral cementation IPS e.max CAD abutment crown / Ti base	Multilink Hybrid Abutment HO 0*																			
	IPS e.max CAD Ceramic Structure	–	**LT BL2**	**LT BL2** [1]	**LT BL2** [1]	**LT A1**	**LT A2**	**LT A3**	**LT A3.5**	**LT A3.5** [1]	**LT B1**	**LT B2**	**LT B2** [1]	**LT B2** [1]	**LT C1**	**LT C2**	**LT C2** [1]	**LT C2** [1]	**LT D2**	**LT D2** [1]	**LT D2** [1]

* the range of products may vary from country to country.

[1] IPS e.max CAD LT Blocks are available in 10 shades. To create the desired tooth shade, select the closest block shade in the respective shade group and determine the restoration shade by means of Stains.

Individual characterizations and shade adjustments of IPS e.max CAD restorations are achieved with IPS e.max CAD Crystall./Shades or IPS Ivocolor Shades and Essences.

IPS e.max Crystall./Shades, Stains

To be used on "blue" and "tooth-coloured" IPS e.max CAD restorations

A–D tooth shade	BL1	BL2	BL3	BL4	A1	A2	A3	A3.5	A4	B1	B2	B3	B4	C1	C2	C3	C4	D2	D3	D4
IPS e.max CAD Crystall./ Shade	0				1					2				3				4		
IPS e.max CAD Crystall./ Shade Incisal	I1							I2		I1				I2						
IPS e.max CAD Crystall./ Stains	white					cream		sunset		copper		olive		khaki		mahogany				

IPS Ivocoloar Shades, Essences

To be used on "tooth-coloured" IPS e.max CAD restorations

A–D tooth shade	BL1	BL2	BL3	BL4	A1	A2	A3	A3.5	A4	B1	B2	B3	B4	C1	C2	C3	C4	D2	D3	D4
IPS Ivocolor Shade	SD 0				SD 1	SD 2			SD 3	SD 4		SD 5		SD 6				SD 7		SD 6
IPS Ivocolor Shade Incisal						SI 1			SI 2			SI 3								
IPS Ivocolor Essence	E 01 white	E 02 cream	E 03 lemon	E 04 sunset	E 05 copper	E 06 hazel	E 07 olive	E 08 khaki	E 09 terracotta	E 10 mahogany	E 11 cappuccino	E 12 espresso	E 13 terra	E 14 profundo	E 15 ocean	E 16 sapphire	E 17 anthracite	E 18 black	E 19 rose	E 20 coral
						E 21 basic red			E 22 basic yellow			E 23 basic blue								

Crystallization and Firing Parameters

The following points should be observed for **ceramic furnaces**, used for the crystallization of IPS e.max CAD:

- Crystallization should be carried out in an Ivoclar Vivadent ceramic furnace (e.g. Programat P310, P510 or P710).
- If you use other, untested ceramic furnaces, please consult Ivoclar Vivadent about their compatibility with IPS e.max CAD.
- Basically, the following applies:
  Ceramic furnaces without
  – function for controlled (long-term) cooling
  – vacuum function
  cannot be used.
- Before the first crystallization and every six months after that, the ceramic furnace must be calibrated.
- Depending on the mode of operation, more frequent calibrations may be required. Observe the manufacturer's instructions.

The following aspects should be observed for **conducting the crystallization**:

- Use only IPS Object Fix Putty or Flow as a firing paste to place the restoration directly on the IPS e.max CAD Crystallization Tray.
- IPS e.max CAD restorations must not be directly placed on the IPS e.max CAD Crystallization Tray and Pins, e.g. without auxiliary firing paste, for crystallization.
- Use exclusively the IPS e.max CAD Crystallization Tray or IPS e.max Speed Crystallization Tray and the corresponding pins.
- Always conduct the crystallization under vacuum.
- Remove IPS e.max CAD objects from the furnace after completion of the firing cycle (wait for the acoustic signal of the furnace).
- Allow the objects to cool to room temperature in a place protected from draft.
- Do not touch the hot objects with metal tongs.
- Do not blast or quench the objects.

These firing parameters are guidance values. They are valid for the Programat furnaces from Ivoclar Vivadent. If furnaces from other manufacturers are used, the firing parameters have to adjusted accordingly, as the case may be.
Deviations may occur:
–Depending on the furnace generation
– In case of regional differences in the power supply or if several electrical devices are operated on the same circuit.

Due to the IPS e.max Crystallization Tray, the firing temperatures vary depending on the furnace used.

Crystallization and Firing Parameters

Crystallization MO, Impulse, LT, MT, HT

with or *without* application of IPS e.max CAD Crystall./ materials

Furnaces Programat	Stand-by temperature B [°C/°F]	Closing time S [min]	Heating rate t_1 [°C/°F/min]	Firing temperature T_1 [°C/°F]	Holding time H_1 [min]	Heating rate t_2 [°C/°F/min]	Firing temperature T_2 [°C/°F]	Holding time H_2 [min]	Vacuum 1 1_1 [°C/°F] 1_2 [°C/°F]	Vacuum 2 2_1 [°C/°F] 2_2 [°C/°F]	Long-term cooling L [°C/°F]	Cooling rate t_l [°C/°Fmin]
P300 P500 P700	403/757	6:00	60/108	770/1418	0:10	30/54	850/1562	10:00	550/770 1022/1418	770/850 1418/1562	700/1292	0
P310 P510 P710	403/757	6:00	60/108	780/1436	0:10	30/54	860/1580	10:00	550/780 1022/1436	780/860 1436/1580	710/1310	0
CS/CS2/CS3	Program 7											

Crystallization LT, MT, HT

with or *without* application of IPS e.max CAD Crystall./ materials

Furnaces Programat	Stand-by temperature B [°C/°F]	Closing time S [min]	Heating rate t_1 [°C/°F/min]	Firing temperature T_1 [°C/°F]	Holding time H_1 [min]	Heating rate t_2 [°C/°F/min]	Firing temperature T_2 [°C/°F]	Holding time H_2 [min]	Vacuum 1 1_1 [°C/°F] 1_2 [°C/°F]	Vacuum 2 2_1 [°C/°F] 2_2 [°C/°F]	Long-term cooling L [°C/°F]	Cooling rate t_l [°C/°Fmin]
P300 P500 P700	403/757	6:00	90/162	820/1508	0:10	30/54	840/1544	7:00	550/820 1022/1508	820/840 1508/1544	700/1292	0
P310 P510 P710	403/757	6:00	90/162	830/1526	0:10	30/54	850/1562	7:00	550/830 1022/1526	830/850 1526/1562	710/1310	0
CS/CS2/CS3	Program 1											

Corrective firing – Stain/Glaze firing

with IPS e.max CAD Crystall./ materials

Furnaces Programat	Stand-by temperature B [°C/°F]	Closing time S [min]	Heating rate t_1 [°C/°F/min]	Firing temperature T_1 [°C/°F]	Holding time H_1 [min]	Heating rate t_2 [°C/°F/min]	Firing temperature T_2 [°C/°F]	Holding time H_2 [min]	Vacuum 1 1_1 [°C/°F] 1_2 [°C/°F]	Vacuum 2 2_1 [°C/°F] 2_2 [°C/°F]	Long-term cooling L [°C/°F]	Cooling rate t_l [°C/°Fmin]
P300 P500 P700	403/757	6:00	90/162	820/1508	0:10	30/54	840/1544	3:00	550/820 1022/1508	820/840 1508/1544	700/1292	0
P310 P510 P170	403/757	6:00	90/162	830/1526	0:10	30/54	850/1562	3:00	550/830 1022/1526	830/850 1526/1562	710/1310	0
CS/CS2/CS3	Program 2											

Firing parameters for the Staining Technique

with IPS Ivocolor Shade, Essence, Glaze

	Stand-by temperature **B** [°C/°F]	Closing time * **S** [min]	Heating rate **t↗** [°C/°F/min]	Firing temperature **T_1** [°C/°F]	Holding time **H** [min]	Vacuum 1 **V_1** [°C/°F]	Vacuum 2 **V_2** [°C/°F]	Long-term cooling ** **L** [°C/°F]	Cooling rate **t_l** [°C/°F/min]
Stain/Glaze firing	403/757	6:00	60/108	710/1310	1:00	450/842	709/1308	0	0

* IRT standard mode
** If the layer thickness is more than 2 mm on the IPS e.max CAD object, long-term cooling (L) to 500°C/932°F is required.

Firing parameters for Corrective firing (Staining Technique)

with IPS e.max Ceram Add-On

	Stand-by temperature **B** [°C/°F]	Closing time * **S** [min]	Heating rate **t↗** [°C/°F/min]	Firing temperature **T_1** [°C/°F]	Holding time **H** [min]	Vacuum 1 **V_1** [°C/°F]	Vacuum 2 **V_2** [°C/°F]	Long-term cooling "" **L** [°C/°F]	Cooling rate **t_l** [°C/°F/min]
Add-On after Glaze firing	403/757	6:00	50/90	700/1292	1:00	450/842	699/1290	0	0

* IRT standard mode
** If the layer thickness is more than 2 mm on the IPS e.max CAD object, long-term cooling (L) to 500°C/932°F is required.

If the layer thickness is more than 2 mm on the IPS e.max CAD object, long-term cooling (L) to 500°C/932°F is required.

Clinical Cases

IPS e.max CAD hybrid abutment / IPS e.max CAD-crown

Dr. R. Watzke / F. Perkon, Ivoclar Vivadent, Liechtenstein

Starting situation with shaped emergence profile

IPS e.max CAD ceramic structure (abutment) / IPS e.max CAD crown, milled

IPS e.max CAD hybrid abutment / IPS e.max CAD crown, completed

Screwed in IPS e.max CAD hybrid abutment

IPS e.max CAD crown on IPS e.max CAD hybrid abutment, cemented

IPS e.max CAD hybrid abutment crown

Dr. L. Enggist / P. Scherrer, Ivoclar Vivadent, Liechtenstein

Starting situation

IPS e.max CAD hybrid abutment crowns (prepared for clinical try-in)

Try-in of the IPS e.max CAD hybrid abutment crowns

Completed IPS e.max CAD hybrid abutment crowns

Seated IPS e.max CAD hybrid abutment crowns

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