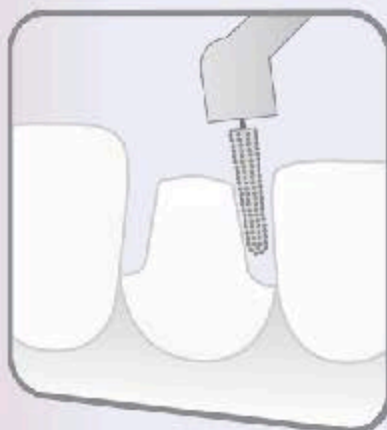


**ie.max<sup>®</sup>**  
IPS

# CLINICAL GUIDE



all ceramic  
all you need



**ivoclar  
vivadent:**  
passion vision innovation

# Contents

4

## IPS e.max® – all ceramics – all you need

- One system for every indication
- Indications

6

## Practical procedure for restorations with IPS e.max®

- Overview
- Tooth – Shade determination
- Preparation
- Die – Shade determination
- Impression
- Cementation
- Intraoral adjustments

20

## Clinical cases

- Step-by-step
  - IPS e.max lithium disilicate veneer cemented with Variolink® Veneer
  - IPS e.max lithium disilicate inlay cemented with Multilink® Automix
  - IPS e.max lithium disilicate anterior crown cemented with Multilink® Automix
  - IPS e.max lithium disilicate posterior crown cemented with Multilink® Automix
  - IPS e.max lithium disilicate anterior bridge cemented with SpeedCEM®
  - IPS e.max zirconium oxide bridge cemented with SpeedCEM®
  - IPS e.max lithium disilicate hybrid abutment and crown cemented with SpeedCEM®
  - IPS e.max lithium disilicate hybrid abutment crown – screwed-in
- Starting situation – Final result

40

## Aftercare

41

## Results from more than 10 years of research

## One system for every indication

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

IPS e.max delivers high-strength and highly esthetic materials for the Press and the CAD/CAM technologies. The system includes the innovative lithium disilicate glass-ceramic used mainly for single-tooth restorations, hybrid abutments and small bridges, as well as the high-strength zirconium oxide for long-span bridges.

**All ceramic materials are based on an integrated material and shade concept for restorations as individual as your patients.**



### **Lithium disilicate glass-ceramic (LS<sub>2</sub>)**

Lithium disilicate (LS<sub>2</sub>) glass-ceramic is ideally suitable for the fabrication of hybrid abutments, as well as monolithic single-tooth restorations and may even be indicated for 3-unit bridges up to the premolar region. The patented glass-ceramic has been tried-and-tested in millions of cases since its introduction. It is distinguished from all previous ceramic materials mainly by its clearly higher stress resistance and its outstanding esthetic appearance.



### **Zirconium oxide (ZrO<sub>2</sub>)**

High-strength zirconium oxide (ZrO<sub>2</sub>) really proves its worth in long-span bridges. It is one of the most efficient all-ceramic materials for dental-lab applications. Zirconium oxide is characterized by its excellent biocompatibility and low heat conductivity and can be indicated for single-tooth restorations and up to 14-unit bridges. Zirconium oxide can be veneered with nano-fluorapatite or lithium disilicate glass-ceramic.



### **Fluorapatite glass-ceramic (FAP)**

IPS e.max Ceram is a highly esthetic layering ceramic for the IPS e.max System. Thanks to the one common layering ceramic, all the veneered IPS e.max restorations exhibit the same wear properties and surface gloss.











Zirconium frameworks pressed over with IPS e.max ZirPress, which are either stained or veneered, are an alternative to conventionally veneered frameworks.

After all, IPS e.max stands for an all-ceramic system that offers an ideal solution for all indications, which not only works from a material standpoint, but is also confirmed by a wealth of scientific data.

From the beginning of its development until to today, the IPS e.max System has been monitored by the scientific community and many renowned experts have contributed to an excellent data base with their studies.

The worldwide success story, the ever growing demand, as well as millions of fabricated restorations are testament to the success and the reliability of the IPS e.max all-ceramic system.

## Indications

Indications		se.max LS <sub>2</sub>	se.max ZrO <sub>2</sub>	Cementation	
				adhesive	self-adhesive/ conventional
Thin veneers 0.3 mm		✓	–	Variolink® Veneer, Variolink® II	–
Veneers		✓	–		
Occlusal veneers		✓	–		
Inlays, onlays		✓	–	Multilink® Auto- mix, Variolink® II	–
Partial crowns		✓	–		
Anterior/posterior crowns		✓	✓ <sup>1)</sup>	Multilink® Automix	SpeedCEM®, Vivaglass® CEM
3-unit bridges		✓ <sup>2)</sup>	✓ <sup>1)</sup>		
4- and multi-unit bridges		–	✓ <sup>1)</sup>		
Hybrid abutments (cemented on a Ti base)		✓	–	Multilink® Automix <sup>3)</sup>	SpeedCEM® <sup>3)4)</sup> , Vivaglass® CEM <sup>3)</sup>
Hybrid abutment crowns (cemented on a Ti base)		✓	–	– <sup>5)</sup>	– <sup>5)</sup>

1) IPS e.max ZrCAD (zirconium oxide) is veneered manually (fluorapatite) or digitally (lithium disilicate).

2) Up to the second premolar

3) For the cementation of the crown on the hybrid abutment

4) Only in conjunction with a suitable bonding agent

5) Hybrid abutment crowns are directly screwed on the implant.

## Contraindications

- Very deep subgingival preparations
- Patients with severely reduced residual dentition
- Parafunctions, e.g. bruxism
- Provisional insertion/trial wear period
- Any other uses not listed in the indications



# Practical procedure for restorations with **IPS e.max**

6

## Overview

Working steps





In the  
dental office








In the  
laboratory

Ivoclar Vivadent product

### Shade determination, preparation, die shade determination, impression

	Tooth – Shade determination on the unprepared tooth and/or adjacent teeth	✓		A-D Shade Guide Chromascop Shade Guide 
	Preparation with suitable grinding instruments	✓		Recommended preparation for all-ceramics 
	Die shade determination on the prepared tooth/die	✓		IPS® Natural Die Material Shade Guide 
	Impression – Silicone or polyether – Digital impression	✓		Virtual® 

### Fabricating the restoration

		✓ <sup>1)</sup>	✓	IPS e.max® CAD IPS e.max® Press 
			✓	IPS e.max® ZirCAD IPS e.max® Ceram IPS e.max® ZirPress IPS e.max® CAD-on 

### Cementation

	Etching <sup>2)</sup>	✓	✓	IPS® Ceramic Etching Gel 
	Cleaning (after try-in)	✓		Ivoclean 
	Conditioning <sup>3)</sup>	✓		Monobond® Plus 
	Cementation – adhesive	✓		Multilink® Automix Variolink® II Variolink® Veneer 
	Cementation – self-adhesive/conventional	✓		SpeedCEM® Vivaglass® CEM 
	Intraoral adjustments	✓		Recommended grinding instruments 

### Aftercare

	Aftercare and preventive care with prophylactic paste	✓		Proxyl® 
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<sup>1)</sup>With chairside CAD/CAM system

<sup>2)</sup>One-time etching (in the dental office or laboratory) is sufficient. Zirconium oxide is not etched.

<sup>3)</sup>No conditioning is required for conventional cementation.



## Tooth – Shade determination

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 by both the dentist and the laboratory.

The overall esthetic result of an all-ceramic restoration is influenced by the following factors:

- **Shade of the tooth stump** (natural stump, devitalized stump, core build-up, abutment)
- **Shade of the cementation material**
- **Shade of the restorative material** (framework shade, translucency/opacity, brightness, veneer, characterization)

### Shade determination of the natural tooth

- Determine the tooth shade of the non-prepared tooth and/or the adjacent teeth after tooth cleaning.
- In addition, determine the cervical shade if a crown preparation is planned, for example.
- Determine the shade at daylight and in front of a neutral background.
- Avoid intensively coloured clothes and/or lipstick as these may compromise the result.
- Use the A-D Shade Guide or Chromascop Shade Guide.





## Preparation

### General preparation guidelines

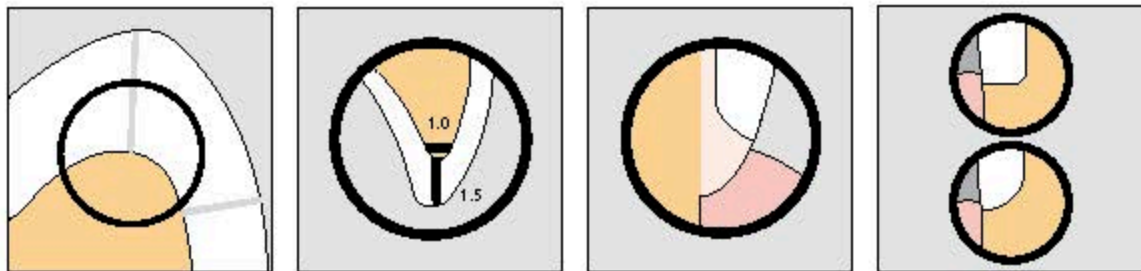
Successful results can only be achieved with IPS e.max if the preparation guidelines below and the minimum layer thicknesses are strictly observed.

**For the preparation of all-ceramic restorations, the following principles apply:**

- No angles or edges
- Shoulder preparation with rounded inner edges and/or chamfer preparation

For **CAD/CAM-fabricated restorations**, the incisal edge of the preparation should be at least 1.0 mm (milling tool geometry) in order to permit optimum milling of the incisal area during CAD/CAM processing.

**The dimensions indicated in the paragraphs below reflect the minimum thickness for IPS e.max restorations.**



### Tip

To be able to work in the oral cavity during preparation with as little interference as possible, we recommend using a lip and cheek retractor as an auxiliary.

**OptraGate® ExtraSoft Version** (lip/cheek retractor):

- Even, circular retraction of lips and cheeks
- Considerably enlarged treatment area
- Greater view, better access



**Thin veneer, veneer**

- If possible, locate the preparation in the enamel.
- Do **not** locate the incisal preparation margins in the area of the abrasion surfaces or dynamic occlusal surfaces.
- If sufficient space is available and depending on the fabrication method, you can even leave out the preparation entirely.

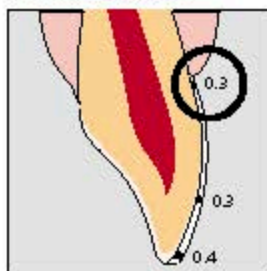
**Thin veneer**

- Ensure that the minimum layer thickness of the thin veneer in the cervical and labial area is 0.3 mm for the PRESS, or 0.4 mm and 0.5 mm for the CAD technique.
- Make sure that the restoration thickness at the incisal edge is 0.4 mm for the PRESS and 0.5 mm for the CAD technique.

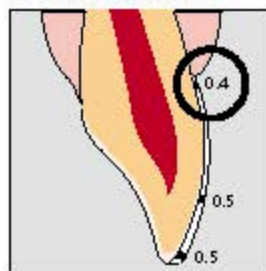
**Veneer**

- Reduce the cervical and/or labial area by 0.6 mm, and the incisal edge by at least 0.7 mm.

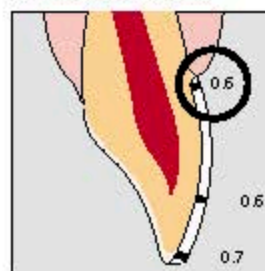
Thin veneer: PRESS



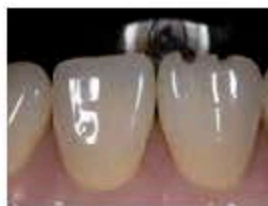
Thin veneer: CAD



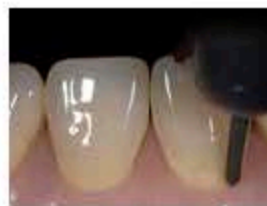
Veneer: PRESS/CAD



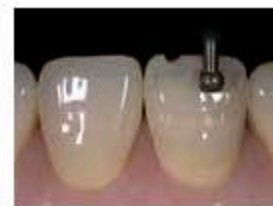
Starting situation



Incisal orientation grooves



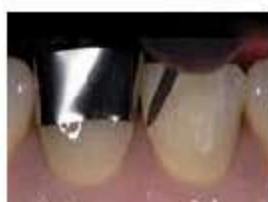
Marginal orientation groove



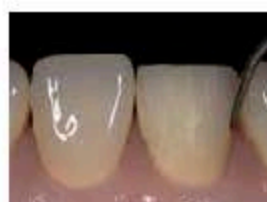
Central and incisal orientation grooves



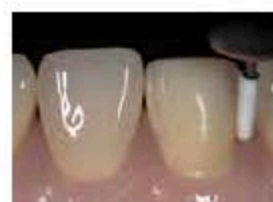
Facial preparation on 3 levels



Initial proximal separation



Definitive proximal preparation

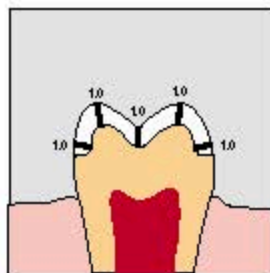


Finishing and smoothing the preparation



### Occlusal veneer

- Evenly reduce the anatomical shape while observing the stipulated minimum thicknesses.
- Prepare a circular shoulder with rounded inner edges or a chamfer at an angle of approximately 10 to 30 degrees.
- Ensure that the width of the circular shoulder/chamfer is at least 1.0 mm.
- Reduce the occlusal part by at least 1.0 mm.



Starting situation



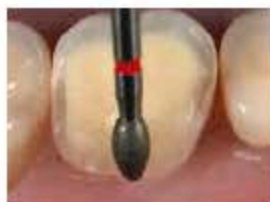
Orientation groove  
central fissure



Orientation grooves  
on the cusps



Shortening  
the occlusal surface



Creating the circular  
preparation margin



Proximal preparation



Finishing the preparation

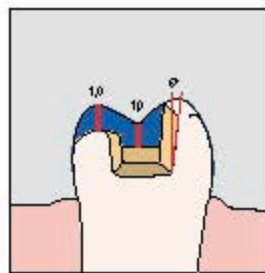
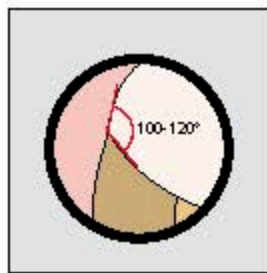
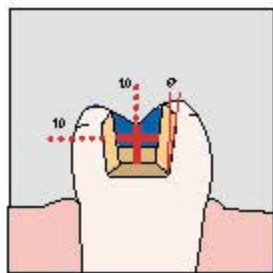


Smoothing the preparation

**Inlay, onlay**

11

- Make sure that the preparation margins are not located in the area of static or dynamic antagonist contacts.
- Ensure that the preparation depth is at least 1.0 mm and that the width of the isthmus is at least 1.0 mm in the fissure area.
- Prepare the proximal box with slightly diverging walls and observe an angle of 100 to 120 degrees between the proximal cavity walls and the prospective proximal inlay surfaces. Avoid marginal ridge contacts on the inlay in case of pronounced convex cavity walls without adequate support by the proximal shoulder.
- Round out internal edges in order to prevent stress concentration within the ceramic material.
- Do not prepare slice-cuts or feather edges.
- Provide at least 1.0 mm of space in the cusp areas for onlays.



Starting situation



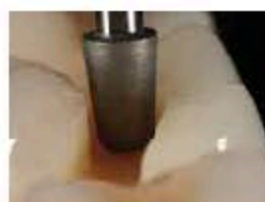
Opening the cavity



Open cavity

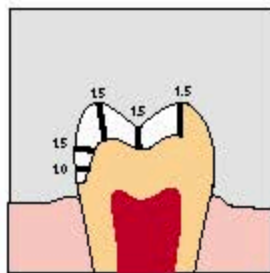


Proximal extension

Proximal:  
box preparationProximal:  
box preparationSmoothing the cavity and  
proximal boxesFinished and smoothed  
preparation

### Partial crown

- Make sure that the preparation margins are not located in the area of static or dynamic antagonist contacts.
- Provide at least 1.5 mm of space in the cusp areas.
- Prepare a circular shoulder with rounded inner edges or a chamfer at an angle of approximately 20 to 30 degrees.
- Ensure that the width of the shoulder/chamfer is at least 1.0 mm.



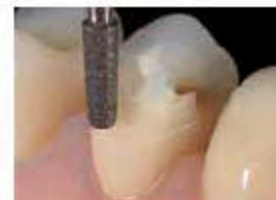
Starting situation



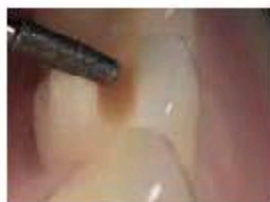
Opening the cavity,  
occlusal orientation grooves



Occlusal and oral reduction  
of the cusp



Creating the circular  
preparation margin



Smoothing the cusps



Proximal preparation



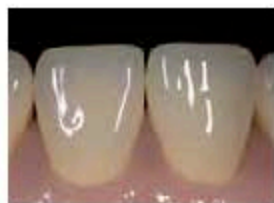
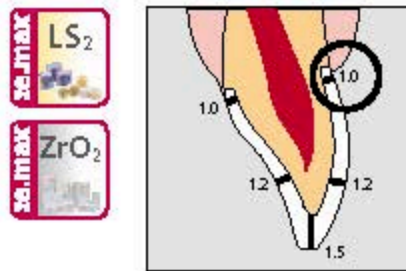
Proximal preparation



Finished and smoothed  
preparation

**Anterior crown**

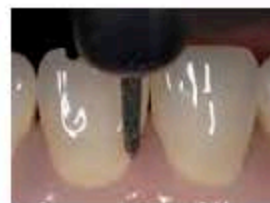
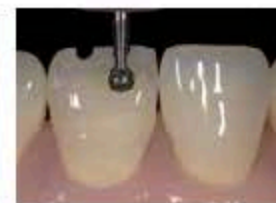
- Evenly reduce the anatomical shape while observing the stipulated minimum thicknesses.
- Prepare a circular shoulder with rounded inner edges or a chamfer at an angle of approximately 10 to 30 degrees. Ensure that the width of the circular shoulder/chamfer is at least 1.0 mm.
- Reduce the incisal crown third by at least 1.5 mm.
- Reduce the vestibular and/or oral area by at least 1.2 mm.
- For conventional and/or self-adhesive cementation, make sure that the preparation demonstrates retentive surfaces and a sufficient preparation height of at least 4.0 mm.



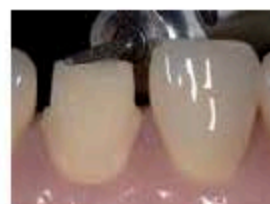
Starting situation



Incisal orientation grooves

Facial and oral:  
marginal orientation grooveFacial: central and incisal  
orientation groovesFacial preparation on  
3 levels:  
oral concavity

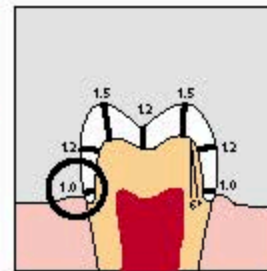
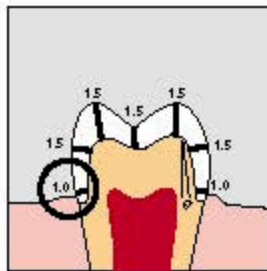
Proximal separation

Incisal shortening  
of the tooth lengthFinishing and smoothing  
the preparation



### Posterior crown

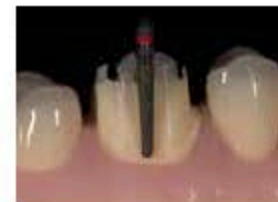
- Evenly reduce the anatomical shape while observing the stipulated minimum thicknesses.
- Prepare a circular shoulder with rounded inner edges or a chamfer at an angle of approximately 10 to 30 degrees. Ensure that the width of the circular shoulder/chamfer is at least 1.0 mm.
- Reduce the occlusal crown third by at least 1.5 mm.
- Reduce the buccal or palatal/lingual area by at least 1.5 mm for LS<sub>2</sub> and by at least 1.2 mm for ZrO<sub>2</sub>.
- For conventional and/or self-adhesive cementation, make sure that the preparation demonstrates retentive surfaces and a sufficient preparation height of at least 4.0 mm.



Starting situation



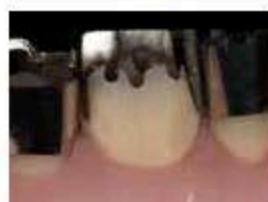
Opening the central fissure


Occlusal  
orientation grooves


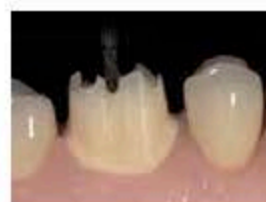
Vestibular preparation



Marginal preparation



Proximal preparation



Occlusal preparation


Finishing and smoothing  
the preparation



**3-unit bridge**

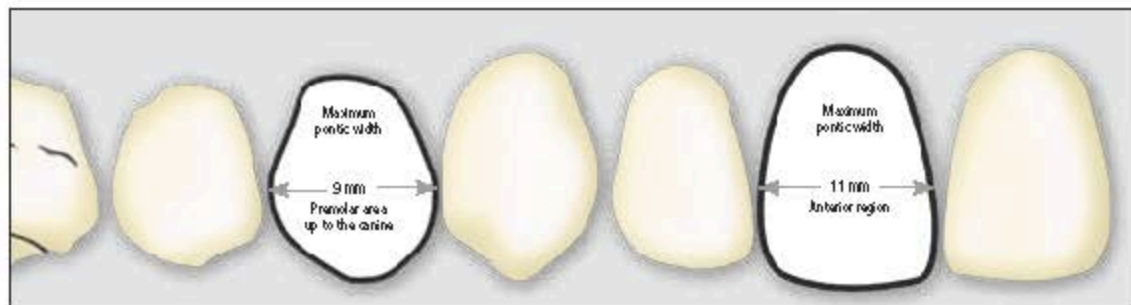
The preparation of the abutment teeth is the same as for anterior and posterior crowns.

**Note regarding lithium disilicate glass-ceramic (LS<sub>2</sub>) bridges:**

Given the different masticatory forces, the maximum acceptable pontic width is different in the anterior and posterior region.

The pontic width is determined on the unprepared tooth.

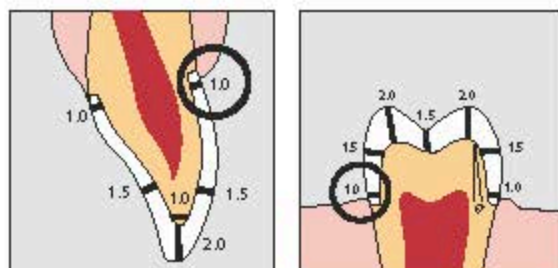
- In the anterior region (up to the canine), the pontic width should **not** exceed 11.0 mm.
- In the premolar region (canine up to the second premolar), the pontic width should **not** exceed 9.0 mm.

**Bridge**

(4- and multi-unit bridges)



- Evenly reduce the anatomical shape while observing the stipulated minimum thicknesses.
- Prepare a circular shoulder with rounded inner edges or a chamfer at an angle of approximately 10 to 30 degrees.
- Ensure that the width of the circular shoulder/chamfer is at least 1.0 mm.
- Reduce the incisal or occlusal crown third by at least 2.0 mm.
- Reduce the vestibular and/or oral area by at least 1.5 mm.





## Die – Shade determination

The IPS Natural Die Material Shade Guide is used to determine the die shade.

Determining the die shade at the end of the preparation is a very important step for the fabrication of all-ceramic restorations. Especially with severely discoloured preparations this is of utmost importance. Only if the dentist determines the shade of the preparation and considers it in the selection of the restorative material, may the desired esthetics be achieved in a targeted fashion.

### Shade determination on the prepared tooth/die

- Carry out the shade determination at daylight.
- Carry out the shade determination on the prepared tooth.
- Use the IPS Natural Die Shade Guide.



### Impression



Take the impression as usual:

- Silicone (e.g. Virtual<sup>®</sup>)
- Polyether
- Digital impression



### Temporary restoration

Function, phonetics and esthetics of the permanent restoration are predefined and may still be adapted any time. For this essential treatment step, the Telio<sup>®</sup> product system provides a multitude of application options.



**Important:** The temporary restoration is cemented with a temporary, eugenol-free cement, such as the dual-curing Telio<sup>®</sup> CS Link.



## Cementation

### Conditioning of the restoration

17

Material	Lithium disilicate $LS_2$			Zirconium oxide $ZrO_2$	
Indication	Thin veneers, veneers, occlusal veneers, inlays, onlays, partial crowns	Crowns and 3-unit bridges up to the second premolar		Crowns and bridges	
Cementation method	adhesive	adhesive	self-adhesive/ conventional	adhesive	self-adhesive/ conventional
Blasting	–			Cleaning with $Al_2O_3$ at a maximum pressure of 1 bar	
Etching	5% hydrofluoric acid (e.g. IPS® Ceramic Etching Gel) 20 s			–	
Conditioning	Monobond® Plus 60 s <sup>1)</sup>			Monobond® Plus 60 s <sup>1)</sup>	
Cementation system	Variolink® Veneer, Variolink® II, Multilink® Automix	Multilink® Automix	SpeedCEM® Vivaglass® CEM	Multilink® Automix	SpeedCEM® Vivaglass® CEM

<sup>1)</sup> With conventional cementation, conditioning is not necessary



Please observe the corresponding Instructions for Use.



- IPS® Ceramic Etching Gel** – to generate retentive bonding surfaces on glass-ceramics
- It decisively enhances the bonding effect between the cementation material and the ceramic.
  - IPS Ceramic Etching Gel must **not** be applied intraorally!



- Ivoclean** – universal cleaning paste to remove proteins
- After the try-in of restorations with already etched surfaces
  - Applied before conditioning



- Monobond® Plus** – universal single-component bonding agent
- Generating an adhesive bond (e.g. of the Variolink and Multilink line of products)
  - For all indirect restorative materials (glass- and oxide-ceramics, metals, composites, fibre-reinforced composites)

**Cementation Navigation System – CNS**

The CNS will support you in the selection of the suitable cementation material in virtually every situation where cementation on natural tooth structure or implant abutments is required. Moreover, the CNS shows you the options provided by the cementation materials from Ivoclar Vivadent. Detailed animations guide you through the comprehensive application protocol – from the removal of the temporary restoration to the final fluoride application.



Available as online application, CD-ROM, and App for iPhone and Android



[www.cementation-navigation.com](http://www.cementation-navigation.com)

**Tip**

To provide the necessary and absolute isolation of the treatment area during incorporation, we recommend using a rubber dam as an auxiliary.

**OptraDam® Plus** (rubber dam):

- Absolute isolation of the treatment area
- Anatomical shape and flexible, three-dimensional design
- Comfortable to wear, even during lengthy procedures

























## Intraoral adjustments

### Recommended grinding instruments for ceramics – use in the dental office

To achieve the expected clinical properties of the ceramic materials, exact polishing after adjustments by grinding is imperative.

	Type of ceramic / Keramiktyp	Extensive corrections / Gross-Korrekturen	Minor corrections / Geringe Korrekturen	Polishing / Polier (Optimalfine)	Endo Access
<b>IPS e.max</b> IPS Inlay's Blinn Form PS0.3GN	Layering ceramics / Schichtkeramik  Flexural strength / Biegezugfestigkeit 80-130 MPa  	 extra fine / extra fein 15-25 µm	 extra fine / extra fein 15-25 µm	 Before polishing / vor der Polier After polishing / nach der Polier High glass + Polierpaste	 medium ≤100 µm
<b>Empress</b>	Leucite-reinforced glass-ceramic / Leuzitverstärkte Glaskeramik  Flexural strength / Biegezugfestigkeit 160 MPa  	 extra fine / extra fein 15-25 µm	 extra fine / extra fein 15-25 µm	 Before polishing / vor der Polier After polishing / nach der Polier High glass + Polierpaste	 medium ≤100 µm
<b>Suprax</b>	Lithium disilicate glass-ceramic / Lithiumdisilikat-Glaskeramik  Flexural strength / Biegezugfestigkeit 360-400 MPa  	 fine / fein 40-80 µm	 extra fine / extra fein 15-25 µm	 Before polishing / vor der Polier After polishing / nach der Polier High glass + Polierpaste	 medium ≤100 µm
<b>Supracor</b>	Zirconium oxide / Zirkoniumoxid  Flexural strength / Biegezugfestigkeit 900 MPa  	 fine / fein 40-80 µm	 fine / fein 40-80 µm	 Before polishing / vor der Polier After polishing / nach der Polier High glass + Polierpaste	 medium ≤100 µm

The provided grain sizes of the diamond burs are recommendations for ceramic materials from Ivoclar Vivadent. The corresponding directions of the manufacturer of the grinding instruments regarding their correct use, e.g. speed, have to be observed.



# Clinical cases – step-by-step

20



## IPS e.max® lithium disilicate veneer cemented with Variolink® Veneer

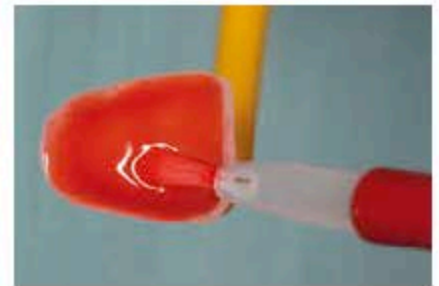
Dr Lukas Enggist / Jürgen Seger (DT), Principality of Liechtenstein



The temporary restorations are removed. The preparations are cleaned with a polishing brush and an oil- and fluoride-free cleaning paste (e.g. Proxyl® fluoride-free). Subsequently, the preparations are rinsed with water spray and dried with oil-free air.



For the esthetic inspection, Variolink® Veneer Try-in Paste can be used. After the try-in, the Try-In Paste is thoroughly washed off with water spray, and the restoration is dried with oil- and moisture-free air.



Etching is performed with 5% hydrofluoric acid (e.g. IPS® Ceramic Etching Gel) for 20 seconds. Subsequently, the preparation is rinsed thoroughly with water and dried with oil-free air.



Monobond® Plus is applied onto the pretreated surface, allowed to react for 60 seconds and then thoroughly dispersed with air.



The treatment field is isolated with a rubber dam (e.g. Optra Dam®) and the preparation is cleaned again according to the steps described above. Subsequently, the preparation is dried with oil-free air. Overdrying must be avoided.



Total Etch (37% phosphoric acid gel) is applied. The phosphoric acid is allowed to react on the enamel for 15–30 seconds and on the dentin for 10–15 seconds.



Subsequently, the gel is thoroughly rinsed off with a vigorous water spray for at least 5 seconds. Excess moisture is removed leaving the dentin surface with a slightly glossy wet appearance (wet bonding).



Syntac® Primer is applied on the preparation using a brush, gently rubbed in and allowed to react for at least 15 seconds. Excess of Syntac Primer is dispersed and thoroughly dried. It is not rinsed off.



Syntac Adhesive is applied and allowed to react for 10 seconds. Subsequently, the preparation is thoroughly dried with an air syringe. It is not rinsed off.



Heliobond is applied and dispersed to a thin layer. Heliobond is only polymerized together with the cementation material.



Variolink Veneer is applied directly onto the preparation and/or onto the inner side of the restoration, if required. Subsequently, it is seated and held in place maintaining stable pressure.



The restoration is tacked in place by light-curing a small area for 3–4 seconds (e.g. Bluephase®, 650 mW/cm², LOW mode). Excess material is removed using a suitable instrument.



In order to prevent oxygen inhibition, the restoration margins are covered with glycerine gel/air block (e.g. Liquid Strip) immediately after removal of excess.



If a curing light with an output of at least 800 mW/cm² is used, each mm of the ceramic material and segment is polymerized for at least 10 seconds. Subsequently, Liquid Strip is rinsed off. The cementation steps are repeated for all veneers.



Proximal areas are reworked using finishing and polishing strips. The restoration margins are polished using polishers (Astropol®) or disks.

A thin layer of Fluor Protector is applied, evenly dispersed and dried with an air syringe.





## IPS e.max<sup>®</sup> lithium disilicate inlay cemented with Multilink<sup>®</sup> Automix

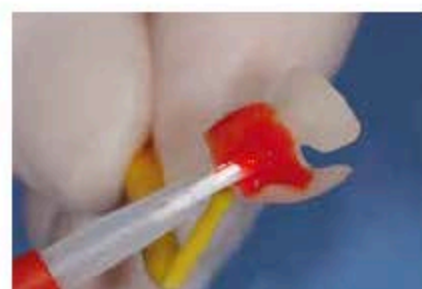
Dr Ronny Watzke / Sandra Sulser (DT), Principality of Liechtenstein



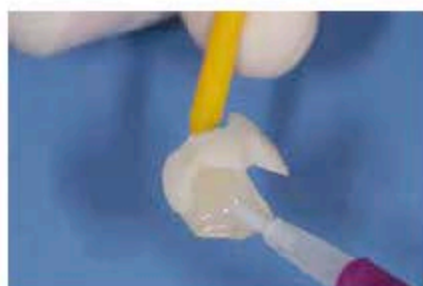
The temporary restoration is removed. The preparation is cleaned with a polishing brush and an oil- and fluoride-free cleaning paste (e.g. Proxyl<sup>®</sup> fluoride-free). Subsequently, it is rinsed with waterspray and dried with oil-free air.



The permanent restoration is tried-in. The shade, fit and occlusion of the restoration are checked. For the esthetic inspection, Multilink Automix Try-In Paste can be used. After the try-in, the Try-In Paste is thoroughly washed off with waterspray, and the restoration is dried with oil-free air.



Etching is performed with 5% hydrofluoric acid (e.g. IPS<sup>®</sup> Ceramic Etching Gel) for 20 seconds. Subsequently, the preparation is rinsed thoroughly with water and dried with oil-free air.



Monobond<sup>®</sup> Plus is applied on the pretreated surface, allowed to react for 60 seconds and then thoroughly dispersed with air.



Reliable isolation of the treatment field (e.g. Optra Dam<sup>®</sup>) is indispensable for the adhesive cementation with composites. The preparation is cleaned again with a polishing brush and an oil- and fluoride-free cleaning paste (e.g. Proxyl<sup>®</sup> fluoride-free). Subsequently, it is rinsed with waterspray and dried with oil-free air. Overdrying must be avoided.



The mixed Multilink<sup>®</sup> Primer A/B is applied on the entire bonding surface (starting from the enamel surface) using a microbrush and rubbed in for 30 seconds.



Excess Multilink Primer is dispersed with air until the mobile liquid film is no longer visible.



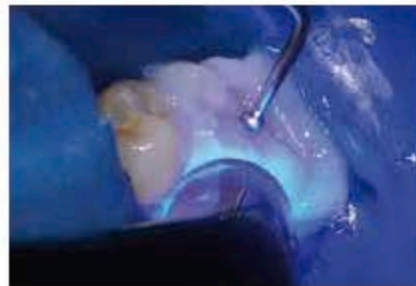
Multilink Automix is dispensed from the automix syringe and applied directly on the restoration. Subsequently, the restoration is seated and held in place maintaining stable pressure.



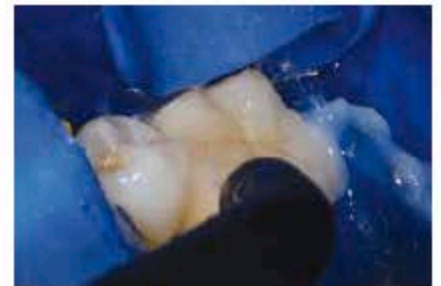
Excess cement material is removed with a microbrush/brush/foam pellet/dental floss. Alternatively, excess material is light-cured with a polymerization device (650 mW/cm<sup>2</sup>: 3 seconds or 1,000 mW/cm<sup>2</sup>: 1–2 seconds per quarter surface) at a distance of 10 mm using the quarter technique and subsequently removed with a scaler.



In order to prevent oxygen inhibition, the restoration margins are covered with glycerine gel/air block (e.g. Liquid Strip) immediately after the removal of excess.



Subsequently, all cementation joints are light-cured (approx. 1,200 mW/cm²) again for 20 seconds. If non-translucent, opaque restorative materials are used, self-curing must be completed.



Subsequently, Liquid Strip is rinsed off and the rubber dam is removed.



Proximal areas are reworked using finishing and polishing strips. The occlusion and function are checked. Restoration margins are polished using polishers (Astropol®) or disks.



A thin layer of Fluor Protector is applied. The varnish is evenly applied and dried with an air syringe.



## IPS e.max<sup>®</sup> lithium disilicate anterior crown cemented with Multilink<sup>®</sup> Automix

Dr Ronny Watzke / Franz Perkon (DT), Principality of Liechtenstein



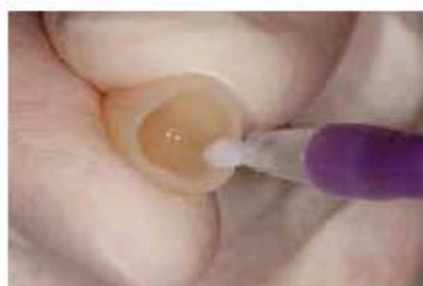
The temporary restoration is removed. The preparation is cleaned with a polishing brush and an oil- and fluoride-free cleaning paste (e.g. Proxy<sup>®</sup> fluoride-free). Subsequently, it is rinsed with water spray and dried with oil-free air.



The permanent restoration is tried-in. For the esthetic inspection, Multilink<sup>®</sup> Automix Try-In Paste can be used. After the try-in, the Try-In Paste is thoroughly washed off with water spray, and the restoration is dried with oil- and moisture-free air.



Etching is performed with 5% hydrofluoric acid (e.g. IPS<sup>®</sup> Ceramic Etching Gel) for 20 seconds. Subsequently, the preparation is rinsed thoroughly with water and dried with oil-free air.



Monobond<sup>®</sup> Plus is applied on the pretreated surface, allowed to react for 60 seconds and then thoroughly dispersed with air.



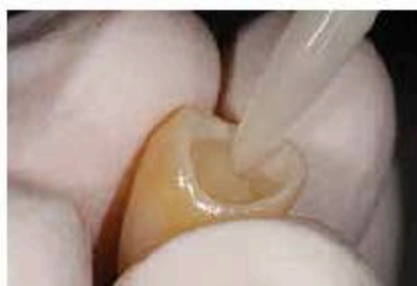
The preparation is cleaned again according to the steps described above. Subsequently, the preparation is dried with oil-free air. Overdrying must be avoided!



The mixed Multilink<sup>®</sup> Primer A/B is applied on the entire bonding surface (starting from the enamel surface) using a microbrush and rubbed in for 30 seconds.



Excess Multilink Primer is dispersed with air until the mobile liquid film is no longer visible.

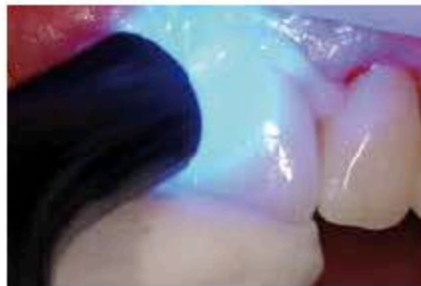


Multilink Automix is dispersed from the automix syringe and directly applied on the restoration.



The restoration is seated and held in place maintaining stable pressure.





Excess cement is light-cured with a polymerization device (650 mW/cm<sup>2</sup>: 3 seconds or 1,000 mW/cm<sup>2</sup>: 1–2 seconds per quarter surface) at a distance of 10 mm using the quarter technique.



Excess material is now easily removed with a scaler.



In order to prevent oxygen inhibition, the restoration margins are covered with glycerine gel air block (e.g. Liquid Strip) immediately after the removal of excess.



Subsequently, all cementation joints are light-cured (approx. 1,200 mW/cm<sup>2</sup>) again for 20 seconds. If non-translucent, opaque restorative materials are used, self-curing must be completed. Subsequently, Liquid Strip is rinsed off.



Proximal areas are reworked using finishing and polishing strips. The occlusion and function are checked. Restoration margins are polished using polishers (Astropol®) or disks.

A thin layer of Fluor Protector is applied. The varnish is evenly dispersed and dried with an air syringe.



## IPS e.max<sup>®</sup> lithium disilicate posterior crown cemented with Multilink<sup>®</sup> Automix

*Dr Arnd Peschke, Principality of Liechtenstein / Chairside*



The preparation is cleaned with a polishing brush and an oil- and fluoride-free cleaning paste (e.g. Proxyl<sup>®</sup> fluoride-free). Subsequently, it is rinsed with water spray and dried with oil-free air.



The permanent restoration is tried-in in the non-crystallized state. Any adjustments of the occlusion contacts can be easily performed before crystallization. Subsequently, the combination firing (crystallization, glaze) is performed.



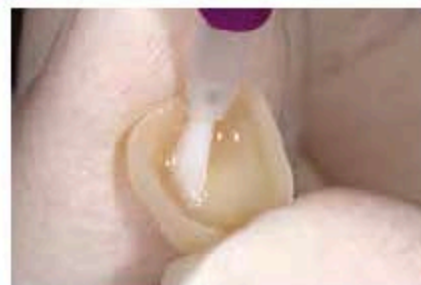
Etching is performed with 5% hydrofluoric acid (e.g. IPS<sup>®</sup> Ceramic Etching Gel) for 20 seconds.



Subsequently, the preparation is thoroughly rinsed with water spray...



...and dried with oil-free air.



Multilink<sup>®</sup> Automix is applied on the pretreated surface, allowed to react for 60 seconds and then thoroughly dispersed with air.



The mixed Multilink® Primer A/B is applied on the entire bonding surface (starting from the enamel surface) using a microbrush and rubbed in for 30 seconds. Excess Multilink Primer is dispersed with air until the mobile liquid film is no longer visible.



Multilink Automix is dispersed from the automix syringe and directly applied on the restoration.



The restoration is seated and held in place maintaining stable pressure.



Excess cement material is light-cured with a polymerization device (650 mW/cm²: 3 seconds or 1,000 mW/cm²: 1–2 seconds per quarter surface) at a distance of 10 mm using the quarter technique.

Excess material is now easily removed with a scaler.



In order to prevent oxygen inhibition, the restoration margins are covered with glycerine gel/air block (e.g. Liquid Strip) immediately after the removal of excess.

Subsequently, all cementation joints are light-cured (approx. 1,200 mW/cm²) again for 20 seconds. If non-translucent, opaque restorative materials are used, self-curing must be completed.



Proximal areas are reworked using finishing and polishing strips. The occlusion and function are checked. Restoration margins are polished using polishers (Astropol) or disks.

A thin layer of Fluor Protector is applied. The varnish is evenly dispersed and dried with an air syringe.





## IPS e.max<sup>®</sup> lithium disilicate anterior bridge cemented with SpeedCEM<sup>®</sup>

*Dr Ronny Watzke / Franz Perkon (DT), Principality of Liechtenstein*



The temporary restoration is removed. The preparation is cleaned with a polishing brush and an oil- and fluoride-free cleaning paste (e.g. Proxyl<sup>®</sup> fluoride-free). Subsequently, it is rinsed with water spray and dried with oil-free air.



The permanent restoration is tried-in. The shade, fit and occlusion of the restoration are now checked.



Etching is performed with 5% hydrofluoric acid (e.g. IPS<sup>®</sup> Ceramic Etching Gel) for 20 seconds. Subsequently, the preparation is rinsed thoroughly with water and dried with oil-free air.



Monobond<sup>®</sup> Plus is applied on the pretreated surface, allowed to react for 60 seconds and then thoroughly dispersed with air.



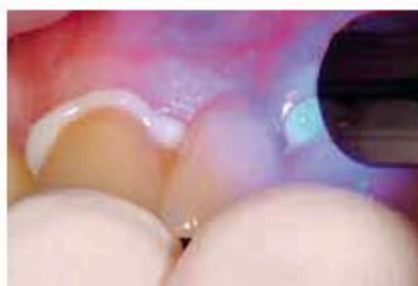
The preparation is cleaned again with a polishing brush and an oil- and fluoride-free cleaning paste (e.g. Proxyl<sup>®</sup> fluoride-free). Subsequently, it is rinsed with water spray and dried with oil- and moisture-free air. Overdrying must be avoided.



SpeedCEM<sup>®</sup> is dispensed from the automatic syringe and the desired amount is applied directly on the bonding surface of the restoration.



The restoration is seated and held in place maintaining stable pressure.



Excess cement material is light-cured with a polymerization device (approx. 650 mW/cm<sup>2</sup>) for 1 second per quarter surface at a distance of approx. 0–10 mm.



The gel-like excess material is now easily removed with a scaler.



In order to prevent oxygen inhibition, the restoration margins are covered with glycerine gel/air block (e.g. Liquid Strip) immediately after the removal of excess.



Subsequently, all cementation joints are light-cured (approx. 1,200 mW/cm<sup>2</sup>) again for 20 seconds. If non-translucent, opaque restorative materials are used, self-curing must be completed.



Subsequently, Liquid Strip is rinsed off.



Proximal areas are reworked using finishing and polishing strips. The occlusion and function are checked. Restoration margins are polished using polishers (Optra Pol® Next Generation) or disks.



A thin layer of Fluor Protector is applied. The varnish is evenly dispersed and dried with an air syringe.





## IPS e.max<sup>®</sup> zirconium oxide anterior bridge cemented with SpeedCEM<sup>®</sup>

*Dr Ronny Watzke / Pascal Scherrer (DT), Principality of Liechtenstein*



The temporary restoration is removed. The preparation is cleaned with a polishing brush and an oil- and fluoride-free cleaning paste (e.g. Proxyl<sup>®</sup> fluoride-free). Subsequently, it is rinsed with water spray and dried with oil-free air.



The permanent restoration is tried-in. The shade, fit and occlusion of the restoration are checked. The inner surface of the restoration is cleaned by blasting it (e.g. IPS e.max<sup>®</sup> ZirCAD, 1 bar,  $\text{Al}_2\text{O}_3$  100  $\mu\text{m}$ ).



The preparation is cleaned again with a polishing brush and an oil- and fluoride-free cleaning paste (e.g. Proxyl<sup>®</sup> fluoride-free). Subsequently, it is rinsed with water spray and dried with oil-free air. Over-drying must be avoided.



The desired amount of SpeedCEM<sup>®</sup> is applied directly onto the bonding surface of the restoration.



The restoration is seated and held in place maintaining stable pressure.



Excess cement material is light-cured with a polymerization device (approx. 650 mW/cm<sup>2</sup>) for 1 second per quarter surface at a distance of approx. 0–10 mm.



Excess material is now easily removed with a scaler.



In order to prevent oxygen inhibition, the restoration margins are covered with glycerine gel/air block (e.g. Liquid Strip) immediately after the removal of excess.



Subsequently, all cementation joints are light-cured (approx. 1,200 mW/cm<sup>2</sup>) again for 20 seconds. If non-translucent, opaque restorative materials are used, self-curing must be completed. Subsequently, Liquid Strip is rinsed off.



Proximal areas are reworked using finishing and polishing strips. The occlusion and function are checked. Restoration margins are polished using polishers (OptraPol® Next Generation) or disks.



A thin layer of Fluor Protector is applied. The varnish is evenly dispersed and dried with an air syringe.



## IPS e.max<sup>®</sup> lithium disilicate hybrid abutment and crown cemented with SpeedCEM<sup>®</sup>

*Dr Ronny Watzke / Jürgen Seger (DT), Principality of Liechtenstein*



The abutment is screwed-in.



The permanent restoration is tried-in. The shade, fit and occlusion of the restoration are now checked.



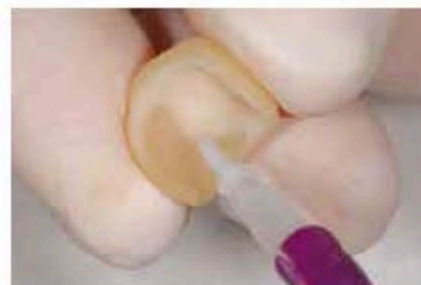
The abutment is cleaned with a polishing brush and an oil- and fluoride-free cleaning paste (e.g. Proxy<sup>®</sup>). Subsequently, it is rinsed with water spray and dried with oil-free air.



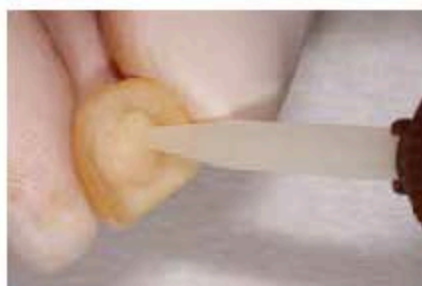
A thin layer of Monobond<sup>®</sup> Plus is applied on the abutment and allowed to react for 60 seconds. Subsequently, the abutment is dried with moisture- and oil-free air.



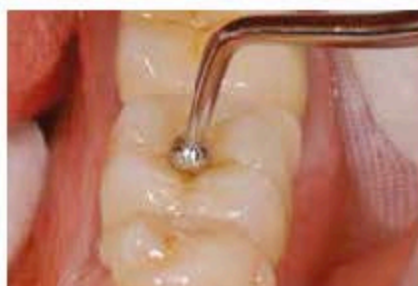
Etching is performed with 5% hydrofluoric acid (e.g. IPS<sup>®</sup> Ceramic Etching Gel) for 20 seconds. Next, the preparation is rinsed thoroughly with water and dried with oil-free air.



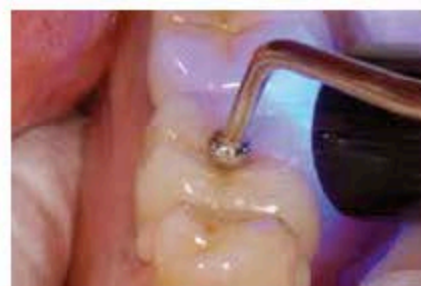
Monobond Plus is applied on the pretreated surface, allowed to react for 60 seconds and thoroughly dispersed.



SpeedCEM<sup>®</sup> is dispensed from the automix syringe and the desired amount is applied directly on the restoration.



The restoration is seated and held in place maintaining stable pressure.



Excess cement material is light-cured with a polymerization device (e.g. Bluephase<sup>®</sup> approx. 650 mW/cm<sup>2</sup>, LOW mode) for 1 second per quarter surface at a distance of approx. 0–10 mm.





The gel-like excess material is now easily removed with a scaler.



In order to prevent oxygen inhibition, the restoration margins are covered with glycerine gel var block (e.g. Liquid Strip) immediately after the removal of excess. Subsequently, all cementation joints are light-cured (approx. 1,200 mW/cm²) again for 20 seconds. If non-translucent, opaque restorative materials are used, self-curing must be completed.



Subsequently, Liquid Strip is rinsed off.



Proximal areas are reworked using finishing and polishing strips. The occlusion and function are checked and adjusted, if required. Restoration margins are polished using polishers (Astropol®) or disks.



A thin layer of Cervitac® Plus is applied. The varnish is left to dry or dried with an air syringe.





## IPS e.max<sup>®</sup> lithium disilicate hybrid abutment crown – screwed-in

*Dr Ronny Watzke / Franz Perkon (DT), Principality of Liechtenstein*



The temporary restoration is removed.



The hybrid abutment crown is screwed in manually with the dedicated screw for the try-in of the permanent restoration. The shade, fit and occlusion of the restoration are now checked. Subsequently, the hybrid abutment crown is carefully removed again for extraoral cleaning.



The hybrid abutment crown is cleaned, rinsed with water spray and then dried with oil-free air.



The screw channel is etched from the occlusal side with 5% hydrofluoric acid gel (IPS<sup>®</sup> Ceramic Etching Gel) for 20 seconds.



Next, the preparation is rinsed thoroughly with water and dried with oil-free air.



The hybrid abutment crown is inserted into the implant intraorally. It is screwed in manually with the appropriate screw, which is tightened with a torque wrench (the instructions of the manufacturer must be observed).



Monobond® Plus is applied on the pretreated surface, allowed to react for 60 seconds and then thoroughly dispersed with air.



Next, cotton or foam pellets are inserted into the screw channel and the bonding system is applied (e.g. Heliobond).



The screw channel is sealed with a composite material (e.g. Tetric EvoCeram®) in the appropriate shade.



Polymerization is performed using an LED polymerization device (e.g. Bluephase®).



The occlusion/articulation is checked after polymerization and any rough spots are removed with suitable fine-grit diamonds. The restoration is polished to a high gloss using silicone polishers (e.g. OptraFine).



A thin layer of Cervitec® Plus is applied. The varnish is left to dry or dried with an air syringe.



# Aftercare

40

## Quality assurance by means of professional care

Like natural teeth, high-quality all-ceramic restorations need regular professional care. The objective is to obtain clean, smooth surfaces on which the growth of bacterial biofilms and the risk of secondary caries and gingivitis is minimized.

### Proxyl®



Peri-implant tissue is more sensitive than gingival tissue. Implant restorations are gently cleaned with the fine Proxyl paste and soft rubber cups or brushes.

The fine Proxyl paste, which does not contain pumice, enables you to effectively clean your high-quality ceramic restorations. The polishing paste ensures a natural gloss and is gentle to the sensitive gingival tissue.

### Fluor Protector



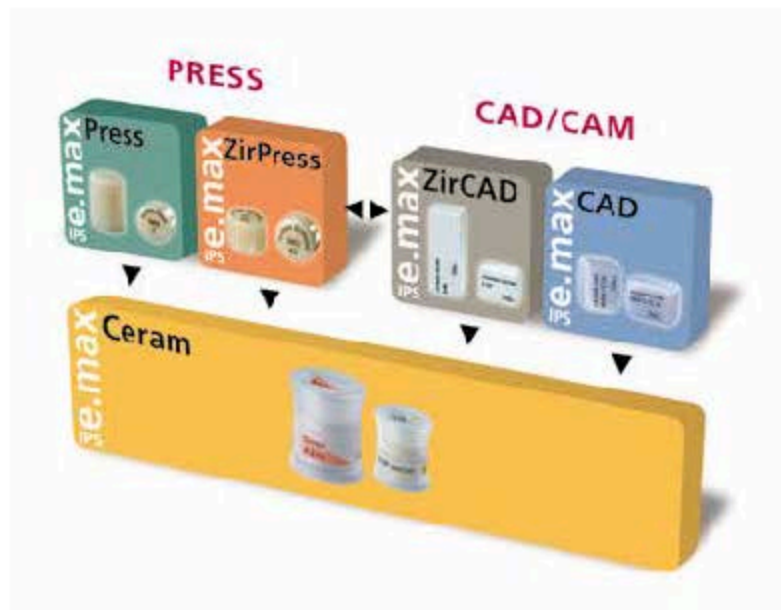
The clear, colourless protective varnish Fluor Protector protects the natural teeth.

A thin layer of Fluor Protector is evenly applied on the previously cleaned and dried teeth. Subsequently the varnish is dried with air. After the treatment, the mouth is not rinsed with water.

# Results

## from more than 10 years of research

The IPS e.max System is an innovative all-ceramic system, which includes materials made of lithium disilicate ( $LS_2$ ) glass-ceramic and zirconium oxide ( $ZrO_2$ ) for the press technique and CAD/CAM technology. In addition, a universally applicable nano-fluorapatite glass-ceramic for veneering all the different components of the IPS e.max System is available.



From the beginning of its development until to today, the IPS e.max System has been monitored by the scientific community and many renowned experts have contributed to the establishment of an excellent data base with their studies. The worldwide success story, the ever growing demand, as well as the more than 40 million 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 involving the e.max System throughout the world show the long-term success of the product in the oral cavities of patients.

### Summary of the IPS e.max System

Data on the clinical use of the IPS e.max System over a period of up to 5 years for  $ZrO_2$  and up to 10 years for  $LS_2$  is available.

The survival rates from clinical studies on IPS e.max Press (6 studies), IPS e.max CAD (6 studies) and IPS e.max ZirCAD (8 studies) were summarized and the overall survival rate of the system was calculated. A total of 1071 IPS restorations from 20 clinical studies were included. The result revealed an overall survival rate of 96.8% for the IPS e.max System.





# Ivoclar Vivadent – worldwide

Ivoclar Vivadent AG  
Benderstrasse 2  
9494 Schaan  
Liechtenstein  
Tel. +423 235 35 35  
Fax +423 235 33 60  
[www.ivoclarvivadent.com](http://www.ivoclarvivadent.com)

Ivoclar Vivadent Pty. Ltd.  
1 – 5 Overseas Drive  
PO. Box 367  
Noble Park, Vic. 3174  
Australia  
Tel. +61 3 9795 9599  
Fax +61 3 9795 9645  
[www.ivoclarvivadent.com.au](http://www.ivoclarvivadent.com.au)

Ivoclar Vivadent Ltda.  
Alameda Calipós, 723  
Centro Empresarial Tamboaré  
CEP 06460-110 Barueri – SP  
Brazil  
Tel. +55 11 2424 7400  
Fax +55 11 3466 0840  
[www.ivoclarvivadent.com.br](http://www.ivoclarvivadent.com.br)

Ivoclar Vivadent Inc.  
1-6600 Dixie Road  
Mississauga, Ontario  
L5T 2Y2  
Canada  
Tel. +1 905 670 8499  
Fax +1 905 670 3102  
[www.ivoclarvivadent.us](http://www.ivoclarvivadent.us)

Ivoclar Vivadent Shanghai  
Trading Co., Ltd.  
2/F Building 1, 881 Wuding Road,  
Jing An District  
200040 Shanghai  
China  
Tel. +86 21 6032 1657  
Fax +86 21 6176 0968  
[www.ivoclarvivadent.com](http://www.ivoclarvivadent.com)

Ivoclar Vivadent Marketing Ltd.  
Calle 134 No. 7-8-83, Of. 520  
Bogotá  
Colombia  
Tel. +57 1 627 3399  
Fax +57 1 633 1663  
[www.ivoclarvivadent.co](http://www.ivoclarvivadent.co)

Ivoclar Vivadent SAS  
B.P. 118  
F-74410 Saint-Jorioz  
France  
Tel. +33 4 50 88 64 00  
Fax +33 4 50 68 91 52  
[www.ivoclarvivadent.fr](http://www.ivoclarvivadent.fr)

Ivoclar Vivadent GmbH  
Dr. Adolf-Schneider-Str. 2  
D-73479 Ellwangen, Jagst  
Germany  
Tel. +49 7961 889 0  
Fax +49 7961 63 26  
[www.ivoclarvivadent.de](http://www.ivoclarvivadent.de)

Wieland Dental + Technik  
GmbH & Co. KG  
Schwenninger Strasse 13  
D-75179 Pforzheim  
Germany  
Tel. +49 7231 3705 0  
Fax +49 7231 3579 59  
[www.wieland-dental.com](http://www.wieland-dental.com)

Ivoclar Vivadent Marketing (India)  
Pvt. Ltd.  
503/504 Raheja Plaza  
15 B Shah Industrial Estate  
Veera Desai Road, Andheri (West)  
Mumbai 400 053  
India  
Tel. +91 22 2673 0302  
Fax +91 22 2673 0301  
[www.ivoclarvivadent.in](http://www.ivoclarvivadent.in)

Ivoclar Vivadent s.r.l.  
Via Isonzo 67/69  
40033 Casalecchio di Reno (BO)  
Italy  
Tel. +39 051 6113555  
Fax +39 051 6113565  
[www.ivoclarvivadent.it](http://www.ivoclarvivadent.it)

Ivoclar Vivadent K.K.  
1-28-24 4F Hongo  
Bunkyo-ku  
Tokyo 113-0033  
Japan  
Tel. +81 3 6903 3535  
Fax +81 3 5844 3657  
[www.ivoclarvivadent.jp](http://www.ivoclarvivadent.jp)

Ivoclar Vivadent Ltd.  
12FW-Tower, 1303-37  
Seocho-dong, Seocho-gu,  
Seoul 137-855  
Republic of Korea  
Tel. +82 2 536 0714  
Fax +82 2 596 0155  
[www.ivoclarvivadent.co.kr](http://www.ivoclarvivadent.co.kr)

Ivoclar Vivadent S.A. de C.V.  
Av. Insurgentes Sur No. 863,  
Piso 14, Col. Napoles  
03810 México, D.F.  
México  
Tel. +52 55 5062 1000  
Fax +52 55 5062 1029  
[www.ivoclarvivadent.com.mx](http://www.ivoclarvivadent.com.mx)

Ivoclar Vivadent B.V.  
De Fruittuinen 32  
2132 NZ Hoorddorp  
Netherlands  
Tel. +31 23 529 3791  
Fax +31 23 555 4904  
[www.ivoclarvivadent.com](http://www.ivoclarvivadent.com)

Ivoclar Vivadent Ltd.  
12 Omega St, Rosedale  
PO Box 303011 North Harbour  
Auckland 0751  
New Zealand  
Tel. +64 9 914 9999  
Fax +64 9 914 9990  
[www.ivoclarvivadent.co.nz](http://www.ivoclarvivadent.co.nz)

Ivoclar Vivadent Polska Sp. z o.o.  
Al. Jana Pawła 1178  
00-175 Warszawa  
Poland  
Tel. +48 22 635 5496  
Fax +48 22 635 5469  
[www.ivoclarvivadent.pl](http://www.ivoclarvivadent.pl)

Ivoclar Vivadent Marketing Ltd.  
Prospekt Andropova 18 korp. 6/  
office 10-06  
115432 Moscow  
Russia  
Tel. +7 499 418 0300  
Fax +7 499 418 0310  
[www.ivoclarvivadent.ru](http://www.ivoclarvivadent.ru)

Ivoclar Vivadent Marketing Ltd.  
Qlaya Main St.  
Sirion Building No.14, 2<sup>nd</sup> Floor  
Office No. 204  
PO. Box 300146  
Riyadh 11372  
Saudi Arabia  
Tel. +966 1 293 8345  
Fax +966 1 293 8344  
[www.ivoclarvivadent.com](http://www.ivoclarvivadent.com)

Ivoclar Vivadent Pte. Ltd.  
171 Chin Swee Road  
#02-01 San Centre  
Singapore 169877  
Tel. +65 6535 6775  
Fax +65 6535 4991  
[www.ivoclarvivadent.com](http://www.ivoclarvivadent.com)

Ivoclar Vivadent S.L.U.  
C/ Ribera del Loira n° 46, 5ª planta  
28042 Madrid  
Spain  
Tel. +34 913 757 820  
Fax +34 913 757 838  
[www.ivoclarvivadent.es](http://www.ivoclarvivadent.es)

Ivoclar Vivadent AB  
Daknågen 14  
S-169 56 Solna  
Sweden  
Tel. +46 8 514 939 30  
Fax +46 8 514 939 40  
[www.ivoclarvivadent.se](http://www.ivoclarvivadent.se)

Ivoclar Vivadent Liaison Office  
: Tesvikiye Mahallesi  
Sakayik Sokak  
Nisantasi Plaza No:382  
Kat:5 Daire:24  
34021 Sili – Istanbul  
Turkey  
Tel. +90 212 343 0802  
Fax +90 212 343 0842  
[www.ivoclarvivadent.com](http://www.ivoclarvivadent.com)

Ivoclar Vivadent Limited  
Ground Floor Compass Building  
Feldspar Close  
Warrens Business Park  
Enderby  
Leicester LE19 4SE  
United Kingdom  
Tel. +44 116 284 7880  
Fax +44 116 284 7881  
[www.ivoclarvivadent.co.uk](http://www.ivoclarvivadent.co.uk)

Ivoclar Vivadent, Inc.  
175 Pineview Drive  
Amherst, N.Y. 14228  
USA  
Tel. +1 800 533 6825  
Fax +1 716 691 2285  
[www.ivoclarvivadent.us](http://www.ivoclarvivadent.us)