

# Chairside fogpótlások anyagtani vonatkozásai

2023 tavaszi félév

Dr. Joós-Kovács Gellért

Semmelweis Egyetem fogpótlástani Klinika

# Felhasználható CAD/CAM anyagok

- Additív
    - SLA
    - Tintasugaras (PPJ, MJ)
    - DLP
    - SLS
    - (FDM)...
  - Fémvázak
  - Hibridkerámia korona/betét..
  - Ideiglenes fogpótlások
  - Viaszmintázatok
  - Mintakészítés
  - Egy. Kanál...
- Szubtraktív
    - Fémek
    - Polimerek
      - Viaszok
      - Akrilátok
      - bioHPP (PEEK)
    - Kerámiák
      - Szilikát-
        - Földpát-
        - Üveg-
      - Oxid-
        - Polikristályos-
        - Üveginfiltrált-
      - Hibrid-
        - Polimer infiltrált-
        - Rezin nano-

# CEREC Primemill

1065

## VIII.-1. táblázat

CEREC Primemill (Dentsply Sirona) marógéppel kompatibilis blokkok: cirkónium-dioxid blokkok, szilikátkerámia blokkok, hibridkerámia blokkok, ideiglenes fogpótláshoz használható blokkok<sup>24</sup>

CIRKÓNIUM-DIOXID BLOKKOK	SZILIKÁTKERÁMIA BLOKKOK	HIBRIDKERÁMIA BLOKKOK	IDEIGLENES FOGPÓTLÁSHOZ BLOKKOK
<ul style="list-style-type: none"> <li>→ CEREC zirconia (Dentsply Sirona)</li> <li>→ CEREC zirconia meso (Dentsply Sirona)</li> <li>→ inCoris TZI (Dentsply Sirona)</li> <li>→ inCoris meso (Dentsply Sirona)</li> <li>→ VITA YZ HT (VITA Zahnfabrik)</li> </ul>	<ul style="list-style-type: none"> <li>→ CEREC Blocs C (Dentsply Sirona)</li> <li>→ CEREC Blocs C PC (Dentsply Sirona)</li> <li>→ CEREC Blocs C In (Dentsply Sirona)</li> <li>→ Celtra Duo (Dentsply Sirona)</li> <li>→ VITABLOCS Mark II (VITA Zahnfabrik)</li> </ul>	<ul style="list-style-type: none"> <li>→ VITA ENAMIC (VITA Zahnfabrik)</li> <li>→ VITA ENAMIC MultiColor (VITA Zahnfabrik)</li> <li>→ VITA ENAMIC IS (VITA Zahnfabrik)</li> <li>→ CeraSmart (GC)</li> </ul>	<ul style="list-style-type: none"> <li>→ CEREC Guide Blocs (Dentsply Sirona)</li> <li>→ VITA CAD-Temp monocolor (VITA Zahnfabrik)</li> <li>→ VITA CAD-Temp multicolor (VITA Zahnfabrik)</li> <li>→ VITA CAD-Temp IS</li> </ul>

Fogpótlástan 2022 Szerk.: Hermann Péter, Kispélyi Barbara



#### Physical properties

		Specification	Typical mean value
Biaxial flexural strength	MPa	≥ 100	272
Water absorption	µg/mm <sup>3</sup>	≤ 40	21
Solubility	µg/mm <sup>3</sup>	≤ 7.5	0.0

		Indications			
		Veneer	Inlay	Onlay (e.g. occlusal veneer, partial crown)	Anterior and posterior crown
Translucency level	HT (High Translucency)	✓	✓	✓	
	MT (Medium Translucency)	✓			✓

Minimum cover thicknesses of Tetric CAD restorations:

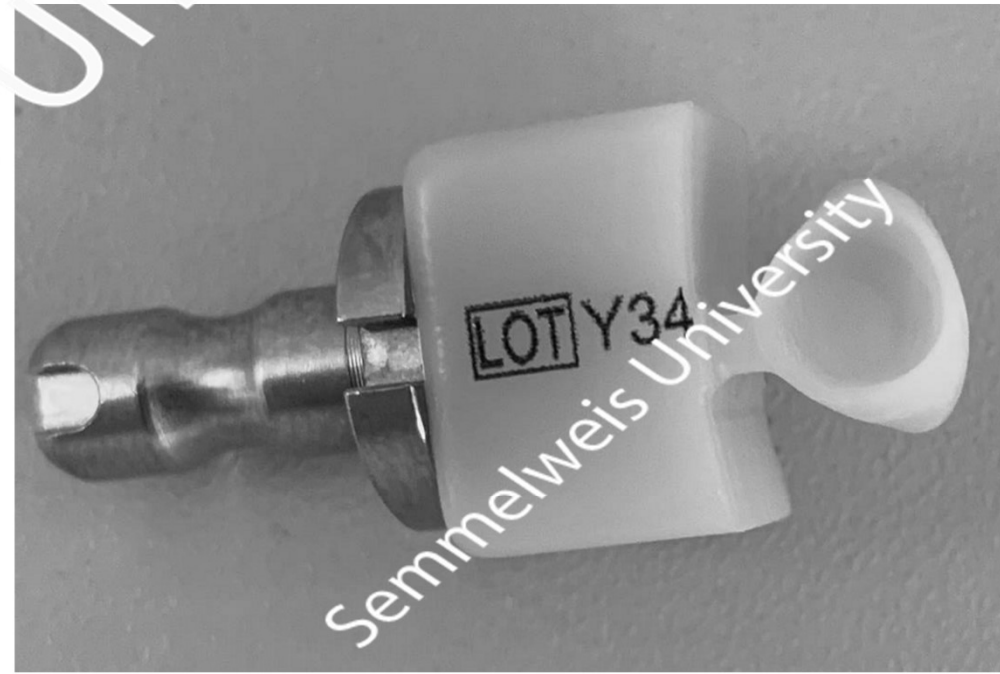
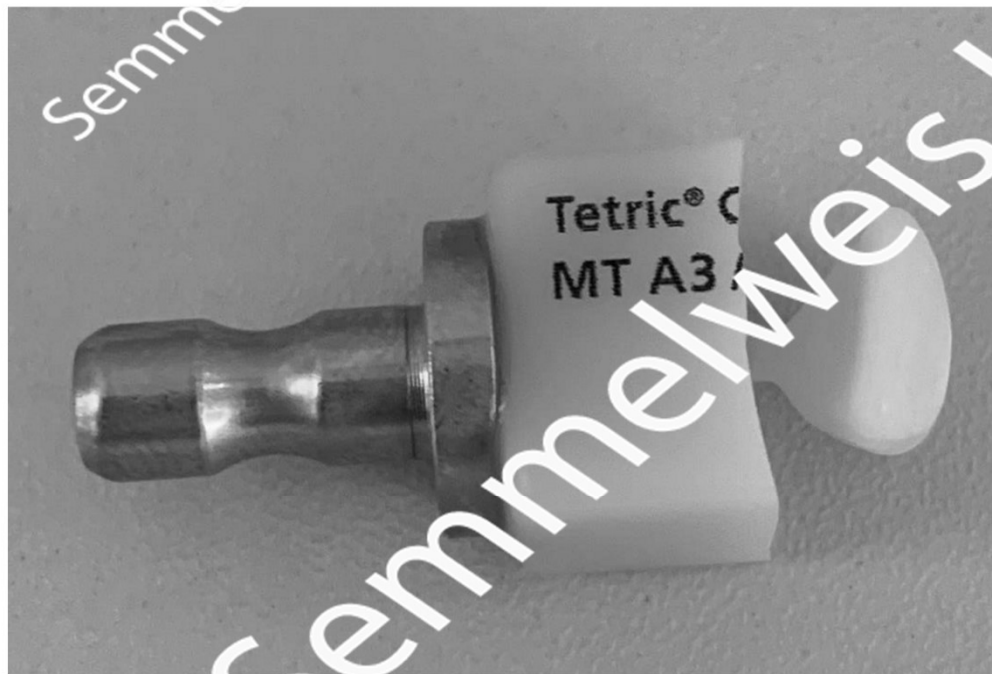
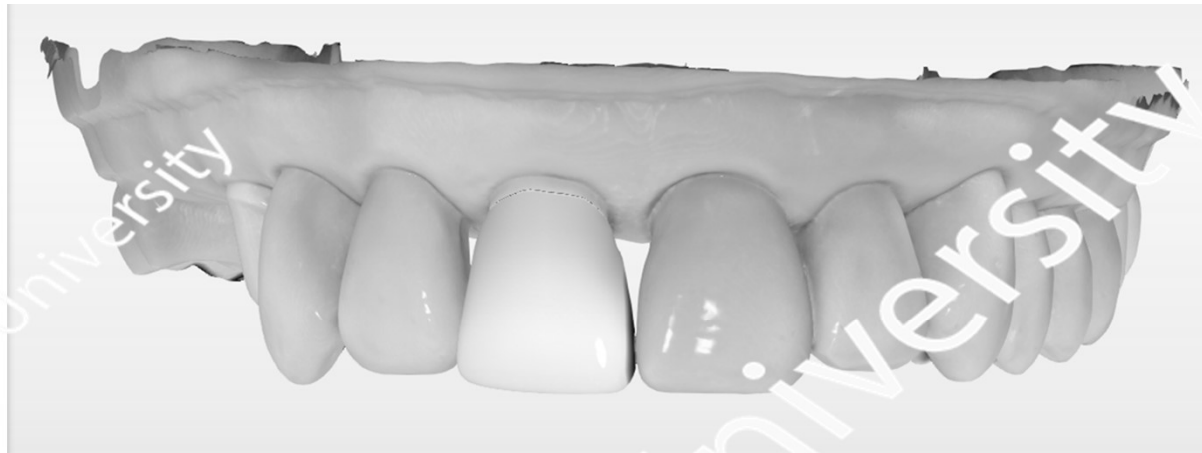
Mandatory adhesive cementation				
	Veneer	Inlay	Onlay (e.g. occlusal veneer, partial crown)	Crown
incisal/occlusal	1.5 mm	1.5 mm	1.5 mm	1.5 mm
circular	0.3–0.6 mm	–	–	0.8 mm

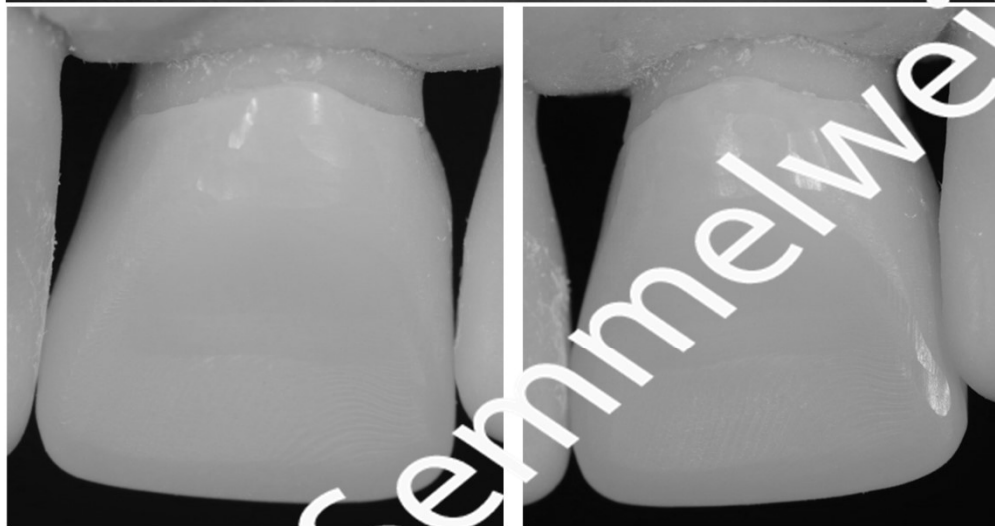
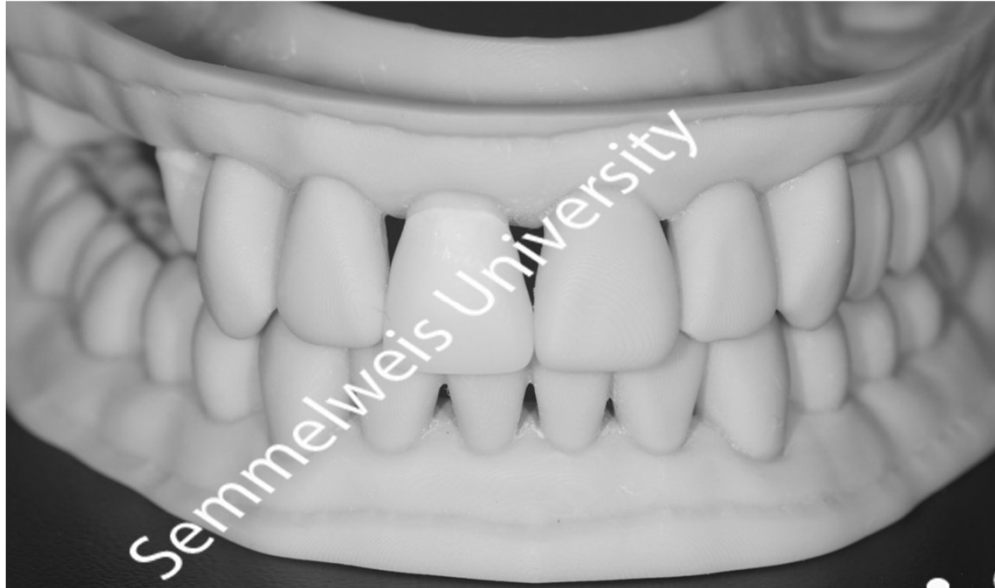
## Composition

### Tetric® CAD

Cross-linked dimethacrylate, inorganic fillers

Forrás: [www.ivoclar.com](http://www.ivoclar.com)





# Kerámiák - Sirona Cerec Blocs C

- Földpát kerámia blokk – magas esztétika
- Adhezív cementezés
- Előre gyártott, készre égetett + magas fényre polírozható finom mikrostruktúra
- „Könnyen” megmunkálható (marás) - 154 Mpa -> 115 MPa
- Zománchoz hasonló kopás
- Koronák, betétek, héjak (8x8x15->12x14x18)
- Blocs C 12 A2 (10x12x15mm)

## CEREC Blocs



Oxide	% of total weight
SiO <sub>2</sub>	56 - 64
Al <sub>2</sub> O <sub>3</sub>	20 - 23
Na <sub>2</sub> O	6 - 9
K <sub>2</sub> O	6 - 8
CaO	0,3 - 0,6
TiO <sub>2</sub>	0,0 - 0,1

Forrás: [www.dentsplysirona.com](http://www.dentsplysirona.com)

Dental technician



**IPS e.max®**

**CAD**

The original lithium disilicate  
CAD/CAM glass-ceramic

All ceramic,  
all you need.

**ivoclar  
vivadent:**  
passion vision innovation



**Veneers**

≥ 0.4 mm



**Occlusal veneers  
(Table tops)**

≥ 1.0 mm



**Inlays**



**Onlays**

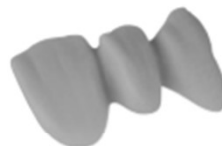


**Partial crowns**



**Crowns**

≥ 1.0 mm in the anterior  
and posterior region



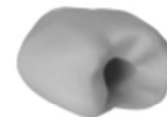
**Three-unit  
bridges**

in the anterior and  
posterior region  
(2nd premolar as the  
terminal abutment)



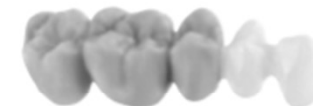
**Hybrid abutments**

in the anterior and  
posterior region as a single  
tooth restoration



**Hybrid abutment  
crowns**

in the anterior and  
posterior region













**Veneering Solution  
veneer structures**

on zirconium oxide  
frameworks

Forrás: [www.ivoclar.com](http://www.ivoclar.com)



	IPS e.max CAD HT	IPS e.max CAD MT	IPS e.max CAD LT	IPS e.max CAD MO	IPS e.max CAD Impulse
<b>Block</b>					
<b>Translucency</b>	 High translucency similar to that of natural enamel	 Medium translucency	 Low translucency similar to that of natural dentin	 Medium opacity	 Lifelike opalescent effect for the replacement of enamel
<b>Shades<sup>1</sup></b>	20 (4 Bleach BL, 16 A–D)	7 (BL2, BL3, BL4, A1, A2, A3, B1)	20 (4 Bleach BL, 16 A–D)	5 (MO 0, MO 1, MO 2, MO 3, MO 4)	2 (Opal 1, Opal 2)
<b>Sizes<sup>1</sup></b>	I12, C14, B40, B40L	C14	I12, C14, C16, A14, A16, B32	C14, A14	C14
<b>Indications</b>	Thin and occlusal veneers Veneers Inlays Onlays Partial crowns	Thin and occlusal veneers Veneers Partial crowns Crowns	Veneers Partial crowns Crowns Bridges Hybrid abutment crowns	Frameworks on lightly stained cores	Thin occlusal veneers Veneers
<b>Technique</b>	Polishing Staining Cut-back CAD-On	Polishing Staining Cut-back	Polishing Staining Cut-back	Layering	Polishing Staining Cut-Back

Forrás: [www.ivoclar.com](http://www.ivoclar.com)

# A finely tuned **system** for **impressive results**

## 1 Simplified block selection



The IPS e.max Navigation App (SNA) assists you in finding the most suitable shade and translucency - for reliable and relaxed working.

## 2 Fast, precision milling



IPS e.max CAD is efficiently and rapidly machined in the PrograMill milling machines to produce high-precision results. The state-of-the-art milling machines are specially designed to machine IPS e.max CAD.

## 3 Optimum enhancement



The sophisticated and innovative Programat® combines high-tech and futuristic design in a highly efficient and user-friendly ceramic furnace. The furnaces increase your profitability and efficiency and heighten the precision of your results.

## 6 Appropriate cementation



Ivoclar Vivadent supplies a specialized cementation system for use with IPS e.max CAD. Depending on the indication at hand, the restorations can be placed using either the adhesive, self-adhesive or conventional luting technique.

- Esthetic cementation with the Variolink® Esthetic luting composite
- Easy conditioning with the self-etching glass-ceramic primer Monobond Etch & Prime®

Finding your way out of the cements maze:  
[www.cementation-navigation.com](http://www.cementation-navigation.com)

## 5 Precision characterization/ glazing



The stains and glazes of the IPS Ivocolor® assortment enable you to customize crystallized IPS e.max CAD restorations.

- Simplified handling due to innovative paste formulation
- High gloss at a firing temperature of only 710° C
- Fluorescence with IPS Ivocolor Glaze Fluo

## 4 Esthetic ceramic layers



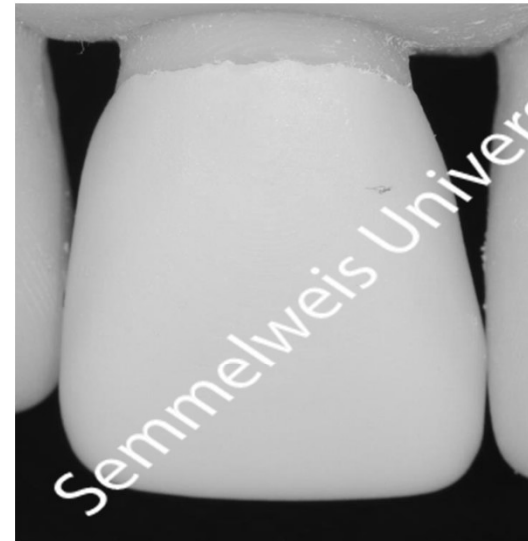
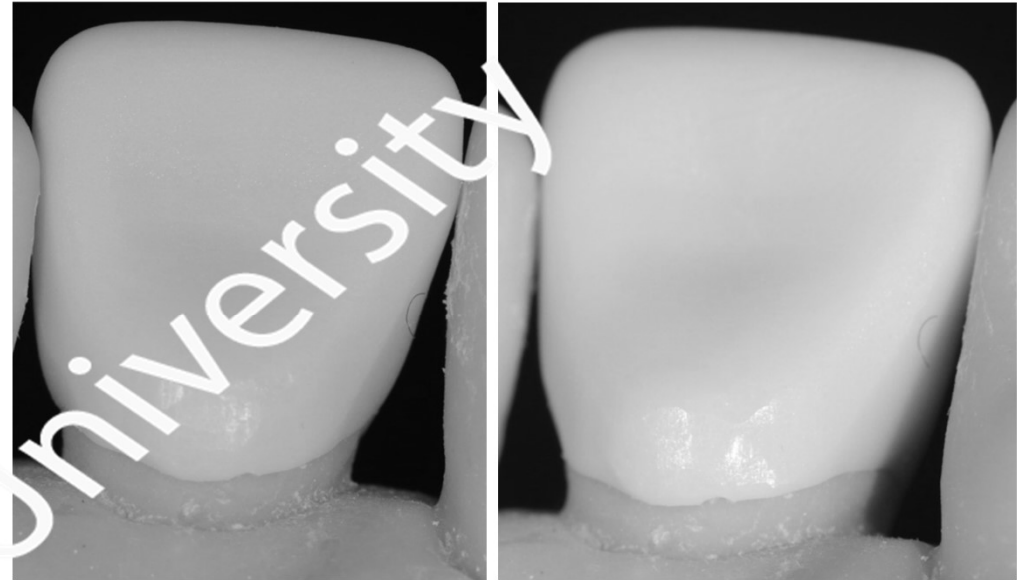
IPS e.max Ceram is a versatile layering ceramic featuring intuitive modelling properties and excellent stability.

- Consistent layering scheme
- Harmonious shade adjustment
- Excellent firing behaviour

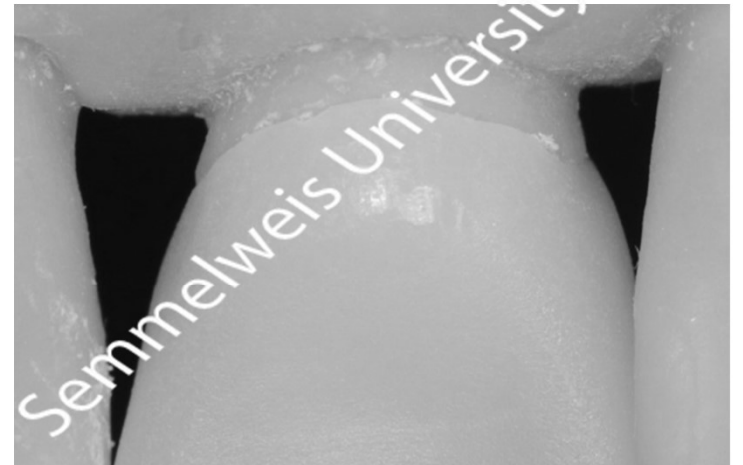
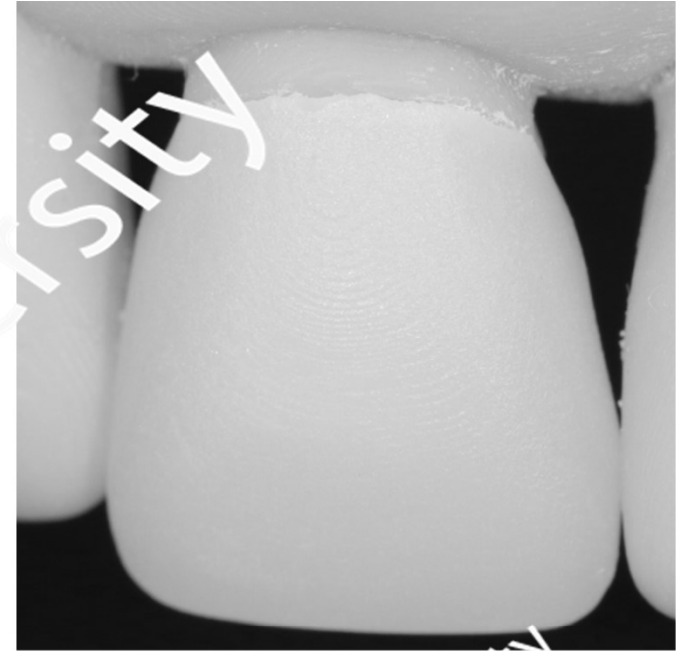
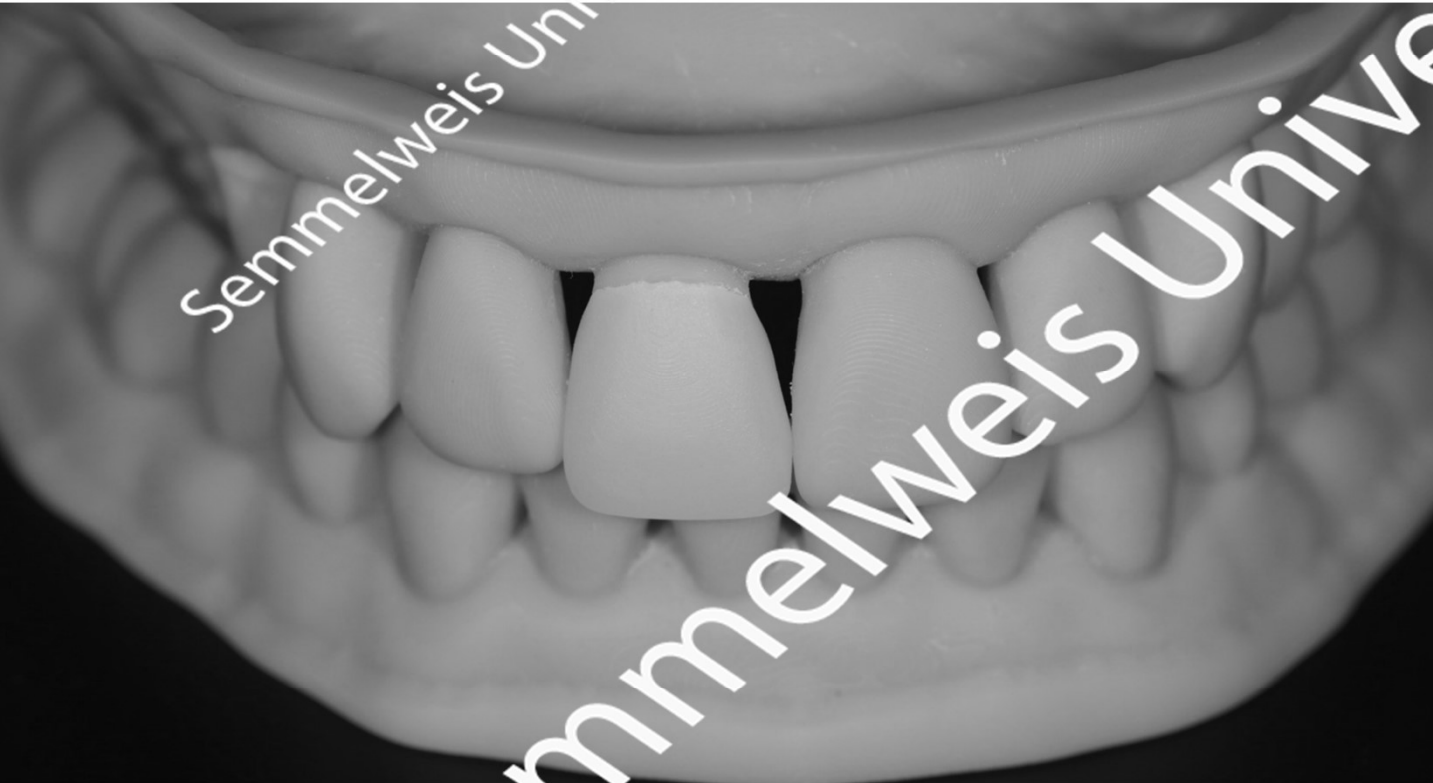
**IPS e.max<sup>®</sup> CAD**  
**Refill for CEREC<sup>®</sup> and inLab<sup>®</sup>**

EN Lithium disilicate glass-ceramic block for the CAD/CAM technology  
 DE Lithiumdisilikat-Glaskeramik Block für die CAD/CAM Technologie  
 FR Vitrocéramique à base de disilicate de lithium présentée sous forme de bloc pour la technique CAD/CAM  
 IT Blocchetto in vetroceramica a base di disilicato di litio per la tecnologia CAD/CAM  
 ES Bloque de cerámica de disilicato de litio para la técnica CAD/CAM  
 PT Bloco de cerâmica de disilicato de lítio para a tecnologia CAD/CAM  
 SV Litium-disilikat glaskeramik block för CAD/CAM teknik  
 DA Lithium-Disilikat glaskeramik blok til CAD/CAM teknikken  
 FI Litium-disilikat lasikeraaminen aihio CAD/CAM tekniikkaan  
 NO Litiumdisilikat glaskeramikkblokk til CAD/CAM-teknikk  
 NL Glaskeramiek-block van lithiumdisilicaat voor de CAD/CAM-technologie  
 EL Κεραμικό βι υαλοκεραμικού από διπυριτικό λίθιο για τεχνολογία CAD/CAM

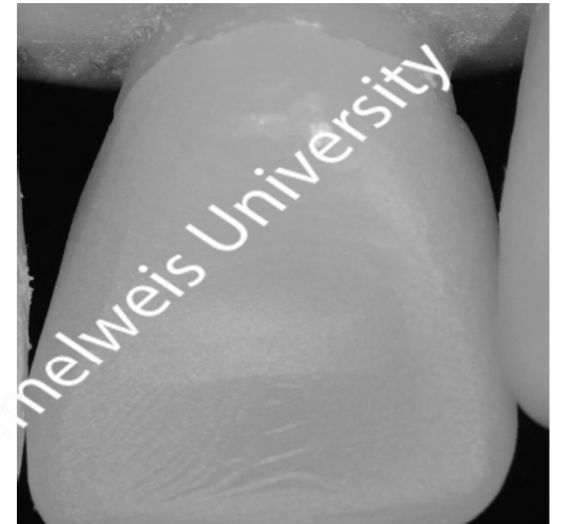
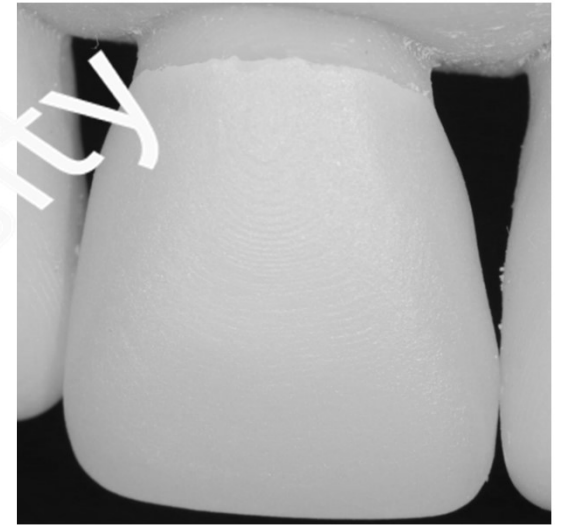
**ivoclar vivadent**  
 passion vision innovation

# ELSŐ ÉGETÉS



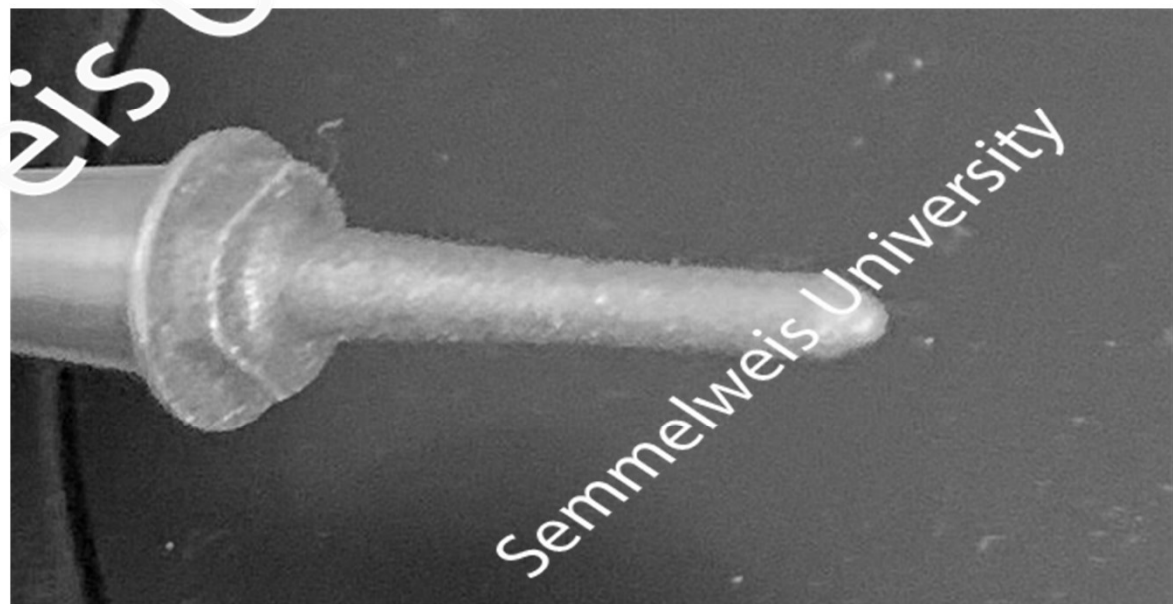
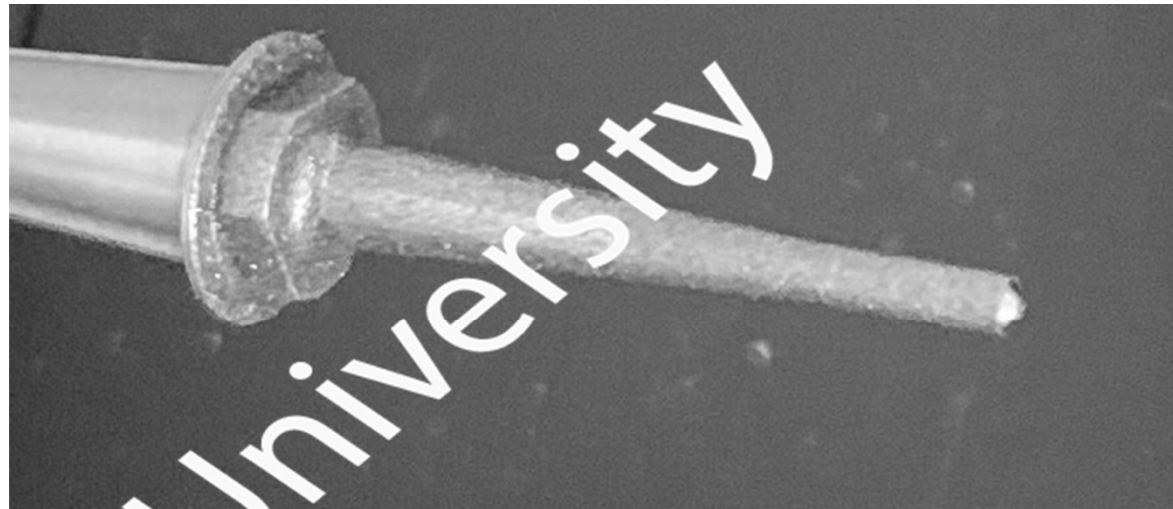
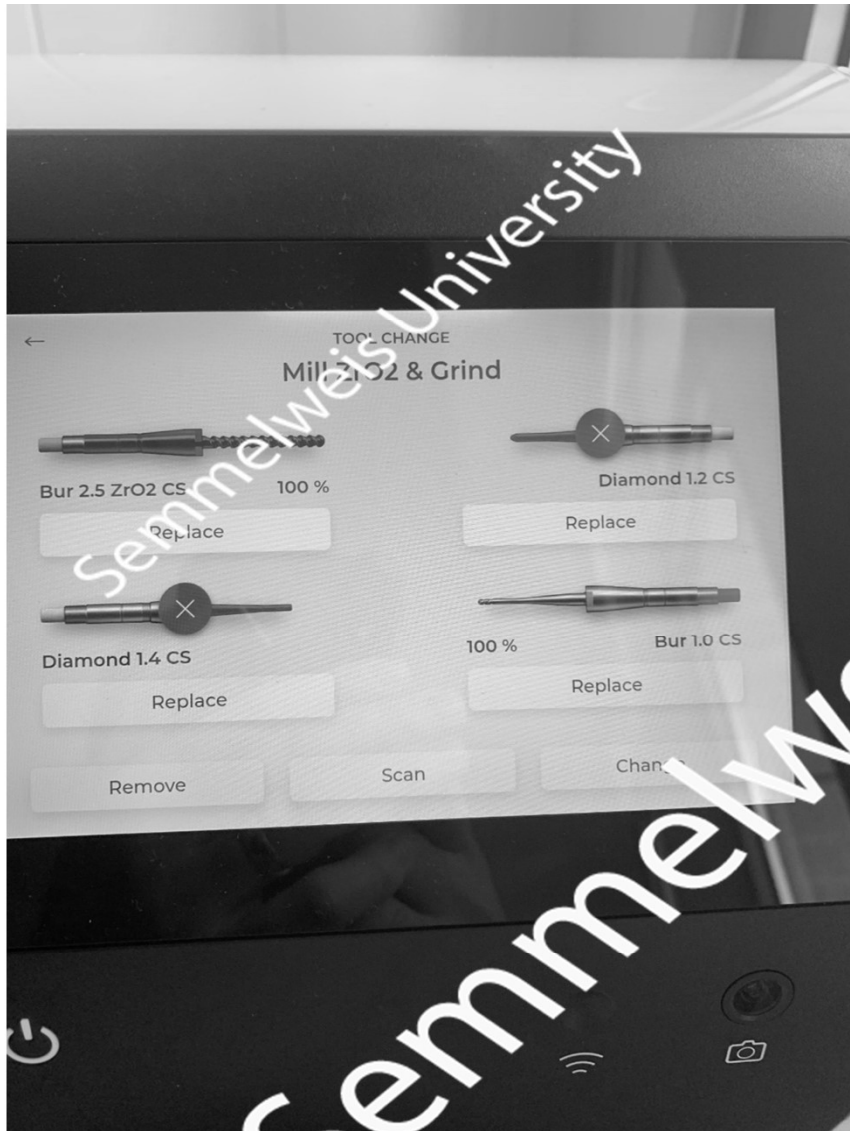
# MÁSODIK ÉGETÉS



Semmelweis University

Semmelweis University

Semmelweis University





# Additív eljárások



**BEGO Otofash**

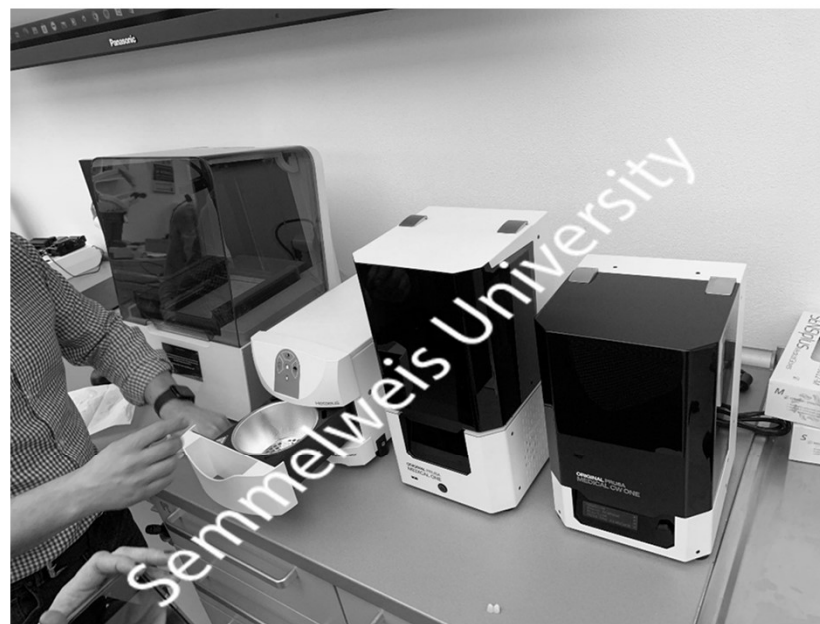
The light-curing device for rapid and reliable light-curing of VarseoWax and VarseoSmile resins



**Varseo Accessories Set**

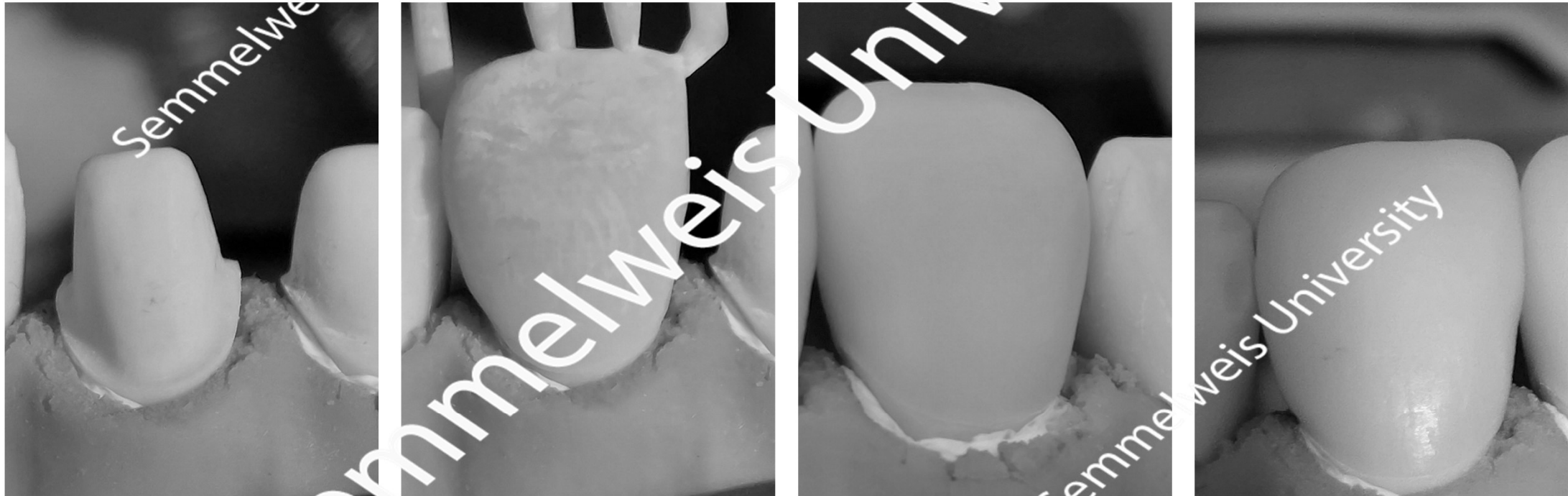
Your introduction to 3D printing with Varseo

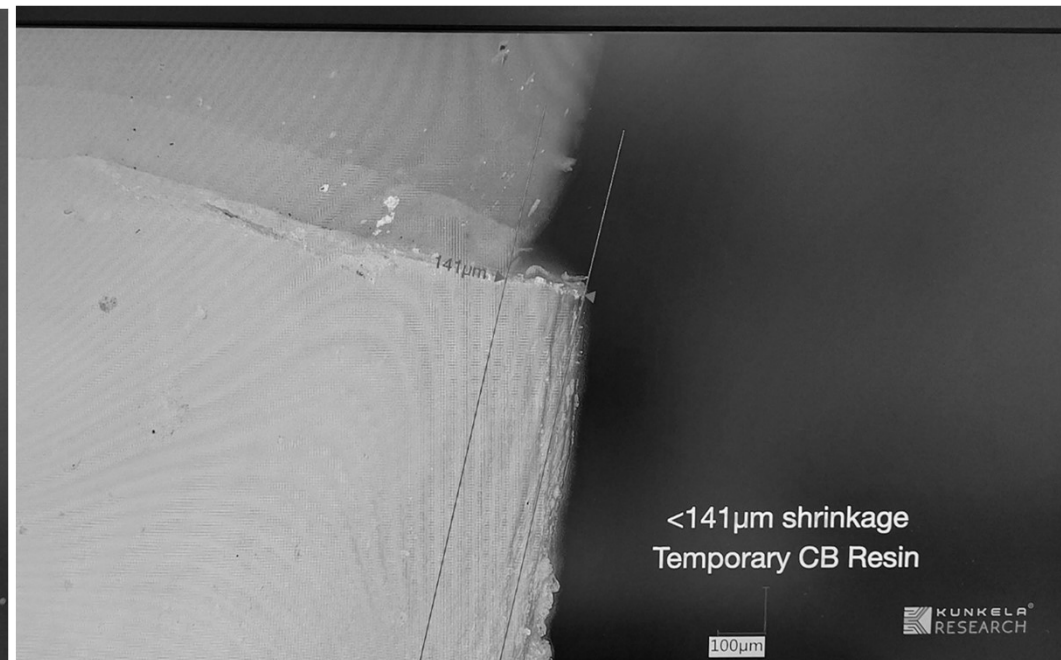
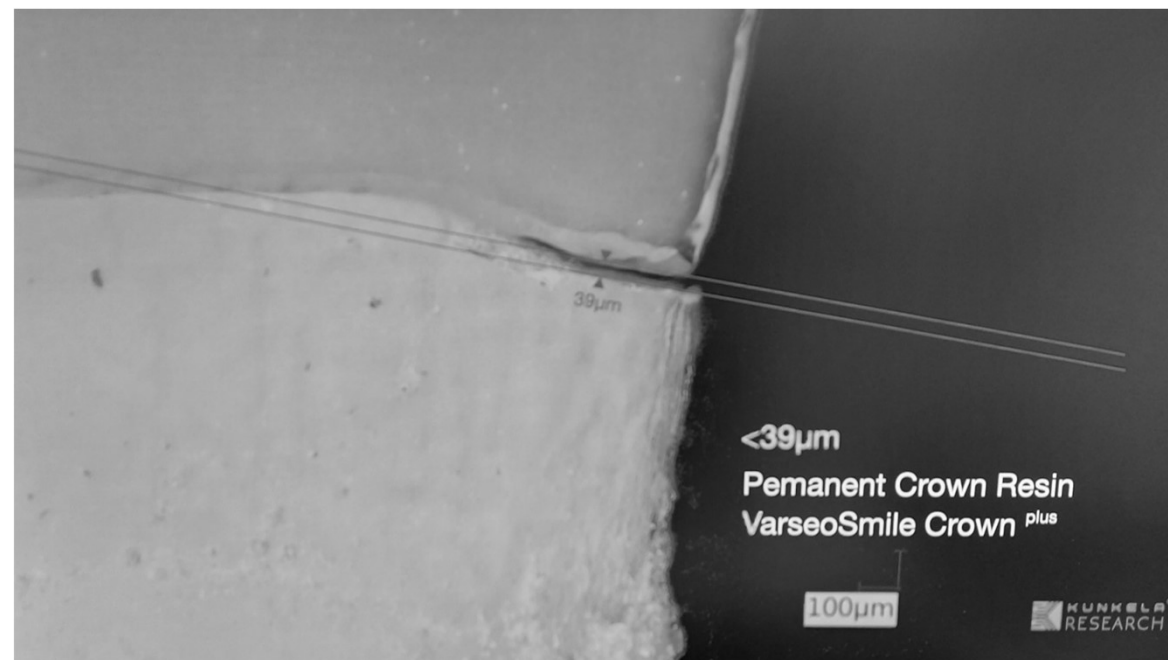
Forrás: [www.bego.com](http://www.bego.com)



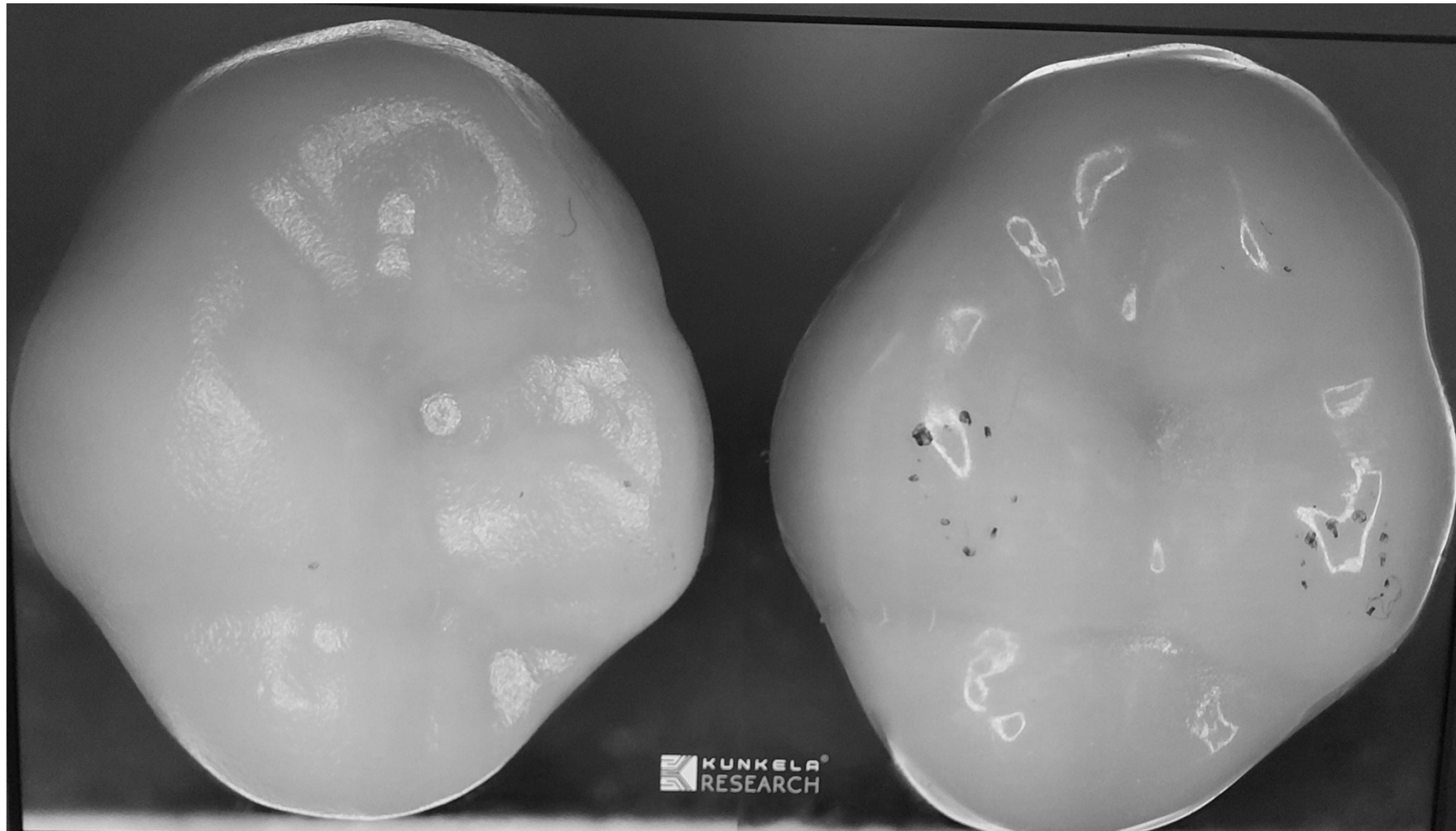


# Resin ideiglenes korona (Formlabs)





Forrás: Kunkela J, Ingr T, Komarek A. Evaluation of marginal gap of teeth restored with crowns using six different CAD/CAM materials milled with two different milling units. Int J Comput Dent. 2021 Jun 4;24(2):195-205. PMID: 34085504.



Forrás: Kunkela J, Ingr T, Komarek A. Evaluation of marginal gap of teeth restored with crowns using six different CAD/CAM materials milled with two different milling units. *Int J Comput Dent.* 2021 Jun 4;24(2):195-205. PMID: 34085504.

# Elkészült fogpótlás rögzítése

**Fogászati rögzítőcementek biztosítják a kapcsolatot a fogpótlás és a preparált fogfelszín között**

- Végleges
  - Rezin
  - Üvegeionomer/rezin módosított ü.i.
  - Cink-foszfát
  - Cink-polikarboxilát
  - Kompomer
- Ideiglenes
  - Cink-oxid-eugenol
  - Eugenol mentes

## Tulajdonságok

- Retenció/adhézió (Fizikai, kémiai, mikromechanikai)
- Kötési idő
- Kötés módja (fényre-, ön-)
- Rétegvastagság
- Oldódás
- Egyéb
  - Antikariogén hatás
  - Esztétika
  - Hővezetés...

Interaction between substrates	Cement type	Film thickness (µm)	Strength (MPa)	
			Compressive	Tensile
Nonadhesive	Zinc phosphate	25–35	96–133	3.1–4.5
Chemical bonding	Polycarboxylate	19–25	57–99	3.6–12
	Glass-ionomer	11–35	93–226	42.53
	Resin-modified glass-ionomer	11–21	85–160	13–25
	Phosphate-modified composite resin (self-adhesive)	13–50	212–291	34
Micromechanical bonding	Self-cured composite resin	24.3–50	292	62
	Light-cured composite resin	5–10	345–400	77.4
	Dual-cured resin cements	16.4	279–352	40–56

Forrás: [www.ivoclar.com](http://www.ivoclar.com)

# Ivoclar Vivadent Multilink Automix

- Szilikát-, oxidkerámiák, kompozitok és fémek
- Önkötő adhezív kompozit, megvilágítással gyorsítható
- Transzparens – esztétika
- Multilink Primer – önsavazó, önkötő primer+bond
  - Adhezív kapcsolat
- Monobond plus – fogpótlás-kompozit kapcsolat
  - Felszínmártás + szilanizálás



EN ISO 4049:2009 Dentistry – Polymer-based restorative materials (ISO 4049:2009)  
Mixing Ratio: Base:Catalyst (1:1)

		Specification	Example value Self-curing	Example value Dual-curing
Film thickness	µm	≤ 50	14	14
Flexural strength	MPa	≥ 50	98	114
Working time (23 °C)	s	≥ 60	164	Not relevant
Setting time (37 °C)	s	≤ 600	273	Not relevant
Water sorption (7 Tage)	µg/mm <sup>3</sup>	≤ 40	28	28
Water solubility (7 Tage)	µg/mm <sup>3</sup>	≤ 7.5	0	0
Radiopacity	% Al	> 100	356	356

Forrás: [www.ivoclar.com](http://www.ivoclar.com)



Köszönöm a figyelmet!