Problem Solving in Dentistry:

NEW MATERIALS AND TECHNIQUES IN PROSTHODONTICS

Asbjørn Jokstad
Institute of Clinical Dentistry, University of Oslo, Norway
Realistic white shades for special cosmetic needs

SYNERGY® Super White shades are ideal for restoring whitened teeth and deciduous teeth.

Only SYNERGY® offers three different bright white shades – selected by dentists.

- Super White N (neutral)
- Super White O (opaque)
- Super White P (pearl)

Let SYNERGY® Super White assist you with your cosmetic needs.

Before veneer

After SYNERGY® Super White veneer
Lebanon Dental Association, Beirut, 28th August 2003

- **Tooth**
- **Tooth + Mucosa**
- **Fixed**
- **Removable**
- **Implant**
- **Mucosa**
New materials & methods–Fixed prosthetics

1. Rotating instrument
2. Root Post
3. Gingival retraction
4. Impression/-tray
5. Bite & jaw registration
6. Color shade
7. Temporary construction
8. Restorative materials
9. Production techniques
10. Cementation
New materials & methods – other topics

- Repairs (Ceram fracture, crown removal, post retrieval, etc.)
- Dental implants
- Articulators
- Attachments
- Dentures: production, materials, lining & repairs
- Laboratories: production, materials
New materials & methods—Fixed prosthetics

Preparation and Finishing Kits

Axis
- Acrylic Adjustment Kit
- R.A.P.T.O.R. Resin Sculpting Set
- R.A.P.T.O.R.

Brasseler
- Acrylic Temporization Kit
- Anterior Bur Box
- Esthetic Inlay/Onlay
- Nixon Inlay/Onlay II
- Nixon Porcelain Veneer II Laminate Veneer System
- Ultra Denture Adjustment & Polishing Kit

Cosmedent
Top Finisher System

Dentsply/Caulk
Enhance Composite Finishing and Polishing System

Nobel Biocare
Procera Preparation Kit
New materials & methods—Fixed prosthetics

Rotating instrument

Root Post

1. Cast
2. Prefabricated
   1. Metal
   2. Non-metal
Cast Posts

1. Indirect
   - Impression

2. Direct: Post & resin
   - Wax
   - Resin
     - Accuset
     - ExactaCast
     - Luminex
     - GC Pattern Resin
Prefabricated Posts in metal

- Steel
- Titanium-alloy
- Titanium

"Active" – "Inactive"

- Conical
- Parallel
- Steps

- Threaded
- Smooth
- Structured

Slots & grooves

- Flat
- Conical
- Ovoid
Posts & Core

1. **Cast Posts**
   1. Indirect
   2. Direct: Post & resin

2. **Prefabricated Posts**

<table>
<thead>
<tr>
<th>Metal</th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-metal</td>
<td>-</td>
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   > 30 products
### "Core"-materials

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<thead>
<tr>
<th>Product</th>
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<td>Build-It! FR</td>
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<td>Vivadent</td>
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<td>Den-Mat</td>
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<td>CoreRestore2</td>
<td>sds/Kerr</td>
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<td>&quot;HDOC&quot;</td>
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<td>CoreShade</td>
<td>Shofu</td>
<td>GIC</td>
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<td>CuRay-support</td>
<td>Sci-Pharm</td>
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<td>Encore</td>
<td>Centrix</td>
<td>Chem. Co.</td>
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<tr>
<td>FluoroCore</td>
<td>Dentsply</td>
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<td>Fuji-II LC</td>
<td>GC</td>
<td>GIC-modif.</td>
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<td>Temrex</td>
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<td>Ketac silver</td>
<td>3M ESPE</td>
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<td>Rebilda</td>
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<td>Ti-Core</td>
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<tr>
<td>Vitremer</td>
<td>3M Espe</td>
<td>GIC-modif.</td>
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Prefabricated Non-metallic Posts
Five main groups

Ceramic

1. Prefabricated
2. Made in the dental technician laboratory
Posts made in ceramics

Prefabricated

Biopost (Incermed), ZrOx, D, ~ 1990
Cerapost (Brasseler), 1995
Cosmopost (Ivoclar), 1998

Laboratory

+ "Cosmopuck" (Ivoclar), 1998
In-Ceram (VITA), 1994
Prefabricated Non-metallic Posts

Five main groups

1. Ceramic, Prefabricated
2. Ceramic, made in laboratory
3. “Black Post”, Carbonfibres dispersed in resin
4. “White Post”, Quartsfibres dispersed in resin
5. “Translucent Post”
Non-metal, non-ceramic Posts

Most producers make both “Black” and “White” Posts, i.e. The resin-part identical
Epoxi, BIS-GMA or other proprietary resins
Big variations with regard to product quality, batch-homogeneity, production method, etc
Different physical-mechanical properties, clinical relevance unknown
Can be removed if revision of endodontic
Non-ceramic Posts - many variants

- Quarts
- Quarts + Zirkonium (Carbon)
- Quarts & Carbon
  - composite
  - "resin"
  - epoxi
  - polyester
Carbonfibre dispersed in resin ("Black Post")

1. Composipost (RTD)
2. Absolu (SPA)
3. Carbonite (H Nordin)
4. Carbopost (Carbotech)
5. C-post (Bisco) (Composipost licenced in USA/Canada)
6. Dental Perfect System (Dental Emco)
7. Miratfite Carbon (Hager) (Carbonite - other name)
8. Top Dent CarbonfiberPost
Quartsfibre dispersed in resin ("White Post")

1. FibreKor Post System (Jeneric/Pentron)
2. Glassix (Harald Nordin)
3. Parapost Fiber White (Coltene Whaledent)
4. Snowpost (Carbotech)
5. Top Dent QuartsfiberPosts
6. Æsthi Plus post (RTD) (promoted in some countries, e.g. Scandinavia as "White Composipost")
Translucent - (Quarts)fibre-reinforced, resin matrix commonly polyester

1. Luscent (Dentatus),
2. Snowlight (Carbotech)
3. Endo-composi-post, D.T – light post or U.M. end-light post, etc. (RTD)
New materials & methods—Fixed prosthetics

Rotating instrument
Root Post

Gingival retraction

1. Cord
   - Impregnated
   - Non-impregnated
2. Gel/paste
3. Cotton
4. Electrosurgery
5. (Cobber-tube)
<table>
<thead>
<tr>
<th>Product</th>
<th>Producer</th>
<th>Active substance</th>
<th>Type</th>
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<tr>
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<td>VOCO</td>
<td>AlCl₃</td>
<td></td>
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<tr>
<td>Biopak</td>
<td>SDI</td>
<td>AlCl₃</td>
<td>twinned</td>
</tr>
<tr>
<td>Crown-Pak</td>
<td>Gingi-Pak</td>
<td>dl-Adrenalin (4-ply)</td>
<td>twinned</td>
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<tr>
<td>Gingi-Aid</td>
<td>Gingi-Pak</td>
<td>Fe₂(SO₄)₃</td>
<td>woven</td>
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<tr>
<td>Gingi-Pak</td>
<td>Gingi-Pak</td>
<td>dl-Adrenalin (2ply- Soft-twist)</td>
<td>twinned</td>
</tr>
<tr>
<td>Gingi-Tract</td>
<td>Den-Mat</td>
<td>AlSO₄, 0.5 mg/i</td>
<td>twinned</td>
</tr>
<tr>
<td>Gingibraid</td>
<td>VanR</td>
<td>AlKSO₄/adrenalin + Aluminium</td>
<td>braided</td>
</tr>
<tr>
<td>Hemalin</td>
<td>VOCO</td>
<td>Adrenalin</td>
<td></td>
</tr>
<tr>
<td>Hemodent</td>
<td>HAWE Premier</td>
<td>AlCl₃ 21%</td>
<td>twinned</td>
</tr>
<tr>
<td>Pascord</td>
<td>Pascal</td>
<td>AlSO₄</td>
<td>twinned</td>
</tr>
<tr>
<td>Racestyptin</td>
<td>Septodont</td>
<td>AlCl₃+lignocain</td>
<td>braided</td>
</tr>
<tr>
<td>Racord</td>
<td>Pascal</td>
<td>dl-Adren HCl +Znfenolsulfonat 0.3%</td>
<td>twinned</td>
</tr>
<tr>
<td>Retracto</td>
<td>Roeko</td>
<td>AlCl₃</td>
<td></td>
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<tr>
<td>Sil-Trax</td>
<td>Pascal</td>
<td>AlSO₄/dl-adrHCl/dl-adr+Znfenolsulfonat</td>
<td>braided</td>
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<tr>
<td>Retreat/II</td>
<td>Henry Schein</td>
<td>AlSO₄/adrenalin</td>
<td>twin/braid</td>
</tr>
<tr>
<td>Sulpak</td>
<td>Sultan</td>
<td>AlK N.F/adrenalin HCl 4%</td>
<td>twin/braid</td>
</tr>
<tr>
<td>Traco</td>
<td>VOCO</td>
<td>AlCl₃ 6%</td>
<td></td>
</tr>
<tr>
<td>Ultrax</td>
<td>Sultan</td>
<td>AlK N.F/adrenalinHCl 4% /AlK+adr</td>
<td>braided</td>
</tr>
<tr>
<td>Unibraid</td>
<td>VanR</td>
<td>Adrenalin-alum</td>
<td>braided</td>
</tr>
<tr>
<td>Z-twist</td>
<td>Gingi-Pak</td>
<td>dl-Adrenalin/ AlCl₃</td>
<td>woven</td>
</tr>
</tbody>
</table>
Retraction Cord, Non-impregnated

Astringedent (Ultradent), Astringedent X (Ultradent), First Stop (Stevenson), Gingi-Aid (Gingi-Pak), Gingiva liquid (Roeko), Hemodent (HAWE Premier), Hemo-gin-L (Van R Dent Prod.), Hemo-stat (Henry Schein), Ocu Clear (Health Care Prod), Orostat (Gingi-Pak), Rastringent (Pascal Comp), Racemistat (Pascal Comp), Stasis (Gingi-Pak), Styptin (Van R Dent. Prod), Ultradent Alum Chlor. (Ultradent), ViscoStat (Ultradent), Visine (Pfizer Inc), Wet Pack (Van R Dent. Prod.)
Expasyl (Kerr / Pierre Roland)

15% Al-Chlorid + Caolin

Lebanon Dental Association, Beirut, 28th August 2003
New materials & methods–Fixed prosthetics

- Rotating instrument
- Root Post
- Gingival retraction
- Impression/ -tray
How to do:

The perfect impression?
Method 1-
One polymerisation
- one viscosity

SYN: One phase technique, Single phase impression, Medium viscosity technique, Single mix technique, Single mix single impression, Monophase technique

Materials – ex.
Aquasil Monophase Dentsply
Examix Monophase GC
Imprint II 3M Espe
Impregum F 3M Espe
Provil Novo Monophase Kulzer
President System 75 Coltene
Method 2-
One polymerisation
- two viscosities

SYN: Double mix technique, Double mix single
impression, Express technique, One step putty wash
 technique, Sandwich impression, Simultaneous one-
step technique, Two phase technique/ impression,
Wet/Wet impression

Materials – ex.
Aquasil Putty + Reprosil HF Light       Dentsply
Examix Putty + Examix Regular eller Inject GC
Express Putty + Express Medium          3M Espe
Impregum F + Permadyne                  3M Espe
Optosil Comfort P Plus + Xantopren      Kulzer
President Heavy + President (Jet) Light Coltene
Method 3 –
Two polymerisations
-two viscosities

SYN: Correction impression, Double impression,
Double mix double impression, Overlay impression,
Putty-wash technique / impression, Two-step putty-
wash technique, Wash technique, Wet/Dry
impression

Materials – ex.
Coltoflax + Coltex Xtrafine        Coltene
Panasil Heavy + Panasil Regular    Kettenbach
President Putty Soft + President (Jet) Light Coltene
Examix Putty + Examix Regular     GC
Express Putty + Express Medium    3M Espe
Aquasil Putty + Reprosil HF Light Dentsply
Method 4 - Dual-arch

SYN: Dual-arch impression, Double-arch impression, Triple tray technique, Closed-bite impression, Double arch single mix impression, Double arch double mix impression
<table>
<thead>
<tr>
<th>Dual-arch</th>
<th>Single-phase</th>
<th>Two-phase</th>
<th>Two-phase - two stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Patient comfort</td>
<td>• Fast</td>
<td>• Hydraulic</td>
<td>• Hydraulic</td>
</tr>
<tr>
<td>• Maximum intercuspid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Easy for laboratory</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Time</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Occlusion?</td>
<td></td>
<td>• Putty : wash hardness?</td>
<td>• Teknique sensitive</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>• Hydraulic</td>
</tr>
<tr>
<td></td>
<td></td>
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<td>Replace</td>
</tr>
</tbody>
</table>

Lebanon Dental Association, Beirut, 28th August 2003
Method 5 - "Hydraulic"
Method 6 - "Laminar"

G Schoenrock (1989)
Method 7 – Tube-section

Excellent technique for periodontally unstable teeth
Impression Materials

Vinyl PolLightiiloxane
1a. Aquasil
   Dentsply/Caulk
1b. Honigum
   DMG/Zenith
1c. Take 1
   sds/Kerr
2a. Imprint II
   3M ESPE
2b. Virtual
   Ivoclar Vivadent
3a. Affinity
   Clinician’s Choice
3b. Splash!
   Discus
4a. AFFINIS
   Coltene/Whaledent
4b. Exafast NDS
   GC

Polyether
1. Permadyne
   3M ESPE
2. Impregum Penta Soft
   3M ESPE
3. Impregum
   3M ESPE
## Most used in USA

<table>
<thead>
<tr>
<th>Material</th>
<th>Crowns /bridges</th>
<th>Inlays /onlays</th>
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<tbody>
<tr>
<td>Vinyl siloxane</td>
<td>81%</td>
<td>71%</td>
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<tr>
<td>Alginate</td>
<td>38%</td>
<td>20%</td>
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<tr>
<td>Polyeter</td>
<td>28%</td>
<td>22%</td>
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</table>

Do you ever use individual tray?

Yes 73%  No 24%

*Dental Products Report Survey, Nov 2000 n= 319 dentists*
Problem nr.1 – Unstable tray

1. Metal
   1. Full arch
   2. Dual-arch

2. Plastic
   1. Full arch
   2. Dual-arch

3. Individual
Trays - metal

- Platinated brass
- Steel
- Titanium
- Aluminium

Perforated
Uperforated
Trays – dentulous
Trays – Dual-arch

- Bite Relator (Temrex)
- Bite Tray (Kerr)
- Exacta
- First Bite
- Quad-Tray
- Tri-Bite (Tri-Bite)
- Triple Tray (Premier)
Trays - plastic
<table>
<thead>
<tr>
<th>Tray Name</th>
<th>Manufacturer</th>
<th>Heat/Curing Method</th>
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</thead>
<tbody>
<tr>
<td>Candulor C-plast</td>
<td>Candulor Dental</td>
<td>Chemical</td>
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<tr>
<td>Cavex Shellac</td>
<td>Cavex</td>
<td>Heat</td>
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<tr>
<td>Citotray</td>
<td>Bayer AG</td>
<td>Light</td>
</tr>
<tr>
<td>Comtray</td>
<td>Schütz Dental</td>
<td>Light</td>
</tr>
<tr>
<td>Easy Tray</td>
<td>Kerr</td>
<td>Heat</td>
</tr>
<tr>
<td>Erkolen</td>
<td>Erkodent</td>
<td>Heat/Vacuum</td>
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<tr>
<td>Extoral</td>
<td>Pro-Den</td>
<td>Light</td>
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<td>Fastray</td>
<td>H Bosworth</td>
<td>Chemical</td>
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<td>Formatray</td>
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<td>Hygon</td>
<td>Premier</td>
<td>Chemical</td>
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<tr>
<td>Individo/Lux</td>
<td>VOCO</td>
<td>Chemical/Light</td>
</tr>
<tr>
<td>Ostron 100</td>
<td>G-C Dental</td>
<td>Chemical</td>
</tr>
<tr>
<td>Palatray/LC</td>
<td>Hereaus Kulzer</td>
<td>Chemical/Light</td>
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<td>Pekatray</td>
<td>Bayer</td>
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<td>SR-Ivolen</td>
<td>Ivoclar</td>
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<td>T-LUX</td>
<td>Scheu Dental</td>
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<td>Schütz Dental</td>
<td>Chemical</td>
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<tr>
<td>Triad</td>
<td>Dentsply</td>
<td>Light</td>
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Trays – metal implant

Kohler Medizintechnik
New materials & methods–Fixed prosthetics

Rotating instrument

Root Post

Gingival retraction

Impression/ -tray

Bite & jaw registration
Bite & jaw registration

Symmetry Facial Plane Relator
Bite Registration Materials

1a. Exabite II NDS
   GC
1b. Jet Bite
   Coltene/Whaledent
1c. Peppermint Snap
   Discus
2a. Blu-Mousse
   Parkell
2b. Vanilla
   Discus
3a. Milk Chocolate
   Discus
3b. Regisil Rigid
   Dentsply/Caulk
3c. Take 1 Bite
   sds/Kerr
4a. LuxaBite
   DMG/Zenith
4b. Virtual Bite
   Ivoclar Vivadent
5. Affinity Quick Bite
   Clinician’s Choice
New materials & methods–Fixed prosthetics

- Rotating instrument
- Root Post
- Gingival retraction
- Impression/ -tray
- Bite & jaw registration

Color shade

Separate lecture about color
New materials & methods–Fixed prosthetics

- Rotating instrument
- Root Post
- Gingival retraction
- Impression/ -tray
- Bite & jaw registration
- Color shade
- Temporary construction
Alternatives

- Bis-Acryl composite
- Polymethyl metacrylate
- Polyethyl methylacrylate
- Microfill light cured
- UDMA composite

Bis-acryl most popular

What type(s) of materials do you use to fabricate temporary restorations in your office?*

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<thead>
<tr>
<th>Material</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Self-cure bis-acryl resin</td>
<td>63%</td>
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<tr>
<td>Stock polycarbonate crowns</td>
<td>40%</td>
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<tr>
<td>PMMA/acyric</td>
<td>34%</td>
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<tr>
<td>PEMA</td>
<td>21%</td>
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<tr>
<td>Microfill</td>
<td>16%</td>
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<tr>
<td>Ethyl vinyl methacrylate</td>
<td>8%</td>
</tr>
<tr>
<td>Light-cured composite</td>
<td>8%</td>
</tr>
<tr>
<td>Urethane dimethacrylate</td>
<td>5%</td>
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<tr>
<td>Thermoplastic</td>
<td>2%</td>
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<tr>
<td>Other</td>
<td>10%</td>
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*Multiple responses accepted.

Source: December 2002 DPR Temporary Restorations Survey
<table>
<thead>
<tr>
<th>Product</th>
<th>Manufacturer</th>
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<td>DMG</td>
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<td>Protemp 3 Garant</td>
<td>3M ESPE</td>
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<tr>
<td>Structur 2</td>
<td>VOCO GmbH</td>
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<td>Detax</td>
</tr>
<tr>
<td>Trim II H</td>
<td>Bosworth</td>
</tr>
</tbody>
</table>
Chemical to elastic stage, final light polymer

- Iso-Temp
- Resin
- Provipont DC
  - Isocyanate-polyol/dimetacrylate
- Unifast LC
  - methyl metacrylate
Temporary cements

- Eugenol-containing
  - E.g. Temp-Bond og IRM
- Non-eugenol-containing
  - E.g. Nogenol og Dycal
- Light & chemical cured
  - E.g. Provilink

---

Zinc oxides top for cements

What types of materials do you use for cementation of temporary restorations?*

<table>
<thead>
<tr>
<th>Material</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zinc oxide eugenol</td>
<td>60%</td>
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<tr>
<td>Zinc oxide non-eugenol</td>
<td>50%</td>
</tr>
<tr>
<td>Resin</td>
<td>23%</td>
</tr>
<tr>
<td>Polycarboxylate</td>
<td>23%</td>
</tr>
<tr>
<td>Other</td>
<td>14%</td>
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</tbody>
</table>

*Multiple responses accepted
Source: December 2002 DPR Temporary Restorations Survey
Temporary cements

- CaOH
  - Provicol
  - Reocap Temp IC
- VOCO
- Vivadent
Temporary cements

- CaOH
- Zn-Ox non-eugenol
  - Freegenol GC
  - Rely-X Temp NE (3M ESPE)
  - Temp-Bond NE sds/Kerr
Temporary cements

- CaOH
- Zn-Ox
- Zn-Ox-Eug
  - Opotow Temporary (Teledyne)
  - Opotow Trial (Teledyne)
  - Rely-X Temp E (3M ESPE)
  - Temp-Bond (sds/Kerr)
Temporary cements

- CaOH
- Zn-Ox
- Zn-Ox-Eug
- Zn-Ox-Eug ++
  - Nobetec
  - Nordenta
Temporary cements

- CaOH
- Zn-Ox
- Zn-Ox-Eug
- Zn-Ox-Eug ++
- Other
  - Durelon (3M ESPE)
  - Provilink (Vivadent)
Temporary cements

- Cavex In-Between
- Ginvatect nF
- Hy-Bond Temp. Cement
- Nogenol
- Neo-Temp
- ProviCem
- SternOmega Temp.Cem
- TempoCem
- Temporan
- Temrex TNE
- Untill
- Zoe B&T

Cavex
Detax
Shofu
Coe Laboratories
Teledyne
DMG
Sterngold
DMG
Detax
Temrex
Sci-Pharm Inc.
Caulk Dentsply
New materials & methods–Fixed prosthetics

- Rotating instrument
- Root Post
- Gingival retraction
- Impression/-tray
- Bite & jaw registration
- Color shade
- Temporary construction
- Restorative materials
Ceramics

All-Purpose
1a. Ceramco 3
   Dentsply/Ceramco
1b. Omega 900
   Vident
2. Ceramco II
   Dentsply/Ceramco
3a. Creation
   Jensen
3b. IPS d.Sign
   Ivoclar Vivadent

Bonded
1. IPS Empress
   Ivoclar Vivadent
2. IPS Eris
   Ivoclar Vivadent
3. OPC
   Pentron
4. Finesse All-Ceramic
   Dentsply/Ceramco

Miscellaneous
1a. Duceram LFC
    Dentsply/Ceramco
1b. Procera AllCeram
    Nobel Biocare
2. Finesse
    Dentsply/Ceramco
3a. In-Ceram Alumina
    Vident
3b. In-Ceram Spinell
    Vident
Most used in USA – full ceramics

1. Pressed 63%
   (e.g., Empress, OPC)
2. Aluminium-oxide 46%
   (e.g., Procera)
3. Lithium disilicate 36%
   (e.g., Empress 2)

*Dental Products Report Survey, Nov 2000 n= 319 dentists*
1. Dr. A. Hüls. Georg-August University, Gottingen, Germany, 1996
3. Lehner, Studer, Schärer. Abstract 1368, IADR, Nice, France 1998
5. Odin, Andersson, Krystek, Magnusson. Thesis at University of Umeå, 1996
Fibre-reinforced Composite

**Laboratory**
- FibreKor & Sculpture
- Vectris & Targis

**Clinic**
- Connect & BelleGlass
- Fiber-splint
- FibreSpan NSI & Nulite
- GlasSpan
- Ribbond & Revolution
- Ribbond Triaxial & Revolution
- Splint-it! & Flow-It! & Protect-It!
- Stick / Sticknet / Everstick

- Glass
- Kevlar
- Polyethylene

- Pre-Impregnated
- Mesh
- Parallel
- Twinned
New materials & methods–Fixed prosthetics

- Rotating instrument
- Root Post
- Gingival retraction
- Impression/ tray
- Bite & jaw registration
- Color shade
- Temporary construction
- Restorative materials

Production techniques
Production techniques - CAD-CAM (CAD-CAM)
### Production techniques- CAD-CAM

<table>
<thead>
<tr>
<th>Company</th>
<th>Description</th>
<th>Country</th>
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</thead>
<tbody>
<tr>
<td>BEGO Medifacturing</td>
<td>BEGO Medical</td>
<td>D</td>
</tr>
<tr>
<td>CAD/CAM System</td>
<td>etkon</td>
<td>D</td>
</tr>
<tr>
<td>CELAY</td>
<td>Mikrona Technologie</td>
<td>CH</td>
</tr>
<tr>
<td>Cercon®</td>
<td>Dentsply/Degudent/Degussa Dental</td>
<td>D</td>
</tr>
<tr>
<td>CEREC3/CEREC Inlab</td>
<td>Sirona Dental Systems</td>
<td>D</td>
</tr>
<tr>
<td>CICERO®</td>
<td>Cicero Dental Systems</td>
<td>NL</td>
</tr>
<tr>
<td>DCS Precident</td>
<td>DCS Dental</td>
<td>CH</td>
</tr>
<tr>
<td>DECIM</td>
<td>DECIM</td>
<td>S</td>
</tr>
<tr>
<td>DENT. CAD/CAM GN-1</td>
<td>GC Corporation</td>
<td>J</td>
</tr>
<tr>
<td>digiDENT®</td>
<td>Girrbach Dental</td>
<td>D</td>
</tr>
<tr>
<td>Everest</td>
<td>KaVo Elektrotechnisches</td>
<td>D</td>
</tr>
<tr>
<td>Lava®</td>
<td>3M ESPE Dental</td>
<td>D</td>
</tr>
<tr>
<td>PRO 50</td>
<td>CYNOVAD&lt;sup&gt;SM&lt;/sup&gt;</td>
<td>Can</td>
</tr>
<tr>
<td>Procera®</td>
<td>Nobel Biocare</td>
<td>S</td>
</tr>
<tr>
<td>WOL-CERAM</td>
<td>WDT-Wolz-Dental-Technik</td>
<td>D</td>
</tr>
<tr>
<td>Xawex</td>
<td>Arnold Wohlend</td>
<td>D</td>
</tr>
</tbody>
</table>
1. Development of materials, e.g. Ceramics

(Tensile strength, Mpa)
2. Development of software
Time - precision

CEREC 1       CEREC 2
3. Development of production units
New materials & methods–Fixed prosthetics

- Rotating instrument
- Root Post
- Gingival retraction
- Impression/ -tray
- Bite & jaw registration
- Color shade
- Temporary construction
- Restorative materials
- Production techniques
- Cementation
Water-based - conventional

Zinc-phosphate Polycarboxylate
Water-based: Glassionomer
Resinmodified GIC & polyacrylate modified resin
# Resin Cements

## Light-Cured/Dual-Cure
1. **Insure/Insure Lite**  
   Cosmedent
2. **Variolink II**  
   Ivoclar Vivadent
3a. **Nexus2**  
   sds/Kerr
3b. **RelyX Veneer Cement**  
   3M ESPE
4a. **Choice**  
   Bisco
4b. **Illusion**  
   Bisco
5. **Calibra**  
   Dentsply/Caulk

## Dual-Cure-Only
1. **Panavia F**  
   Kuraray
2. **RelyX ARC**  
   3M ESPE
3. **Bistite II DC**  
   Tokuyama Soda/J. Morita USA
4. **Duo-Link**  
   Bisco
5a. **Cement-It!**  
   Universal C & B  
   Pentron
5b. **PermaFlo DC Indirect Luting/Restorative Resin**  
   Ultradent

## Self-Cure
1. **Panavia 21**  
   Kuraray
2. **Post Cement HI-X**  
   Bisco
3a. **C & B Metabond**  
   Parkell
3b. **M-Bond**  
   Tokuyama Soda/J. Morita USA
4. **C&B Cement**  
   Luting Composite  
   Bisco
<table>
<thead>
<tr>
<th>Cement Type</th>
<th>MC</th>
<th>Ceram</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hybrid ionomer</td>
<td>65%</td>
<td>46%</td>
</tr>
<tr>
<td>Adhesive resin</td>
<td>46%</td>
<td>63%</td>
</tr>
<tr>
<td>Glass ionomer</td>
<td>33%</td>
<td></td>
</tr>
</tbody>
</table>

Cementering av en IPS Empress ersättning

Tag bort provisoriet

Prova ersättningen tillsammans med glycerinbad

Torrläggning

Ersättning

Kavitet

Skölj

Torrblästra

Förbehandling av IPS Empress keramik:
Om inte arbetet här
fluoridbänks behandlats
högerandtekniker, måste
sköjtn fastställas. Lägg på
IPS Ceramic engång 60
sek. Läss säkerhetsföre-
kommande!

Silanering

Monobond-S

Torrblästra

Emalj/dentin* Utanför
fastsyras

Skölj

Torrblästra

Dentin/emalj
Syntac Primer

Torrblästra

Syntac
Adhesive

Torrblästra

Emalj och
dentin

Torrblästra

HEtobond

Placera ersättning

Tag bort överskott

Ljushärda

Grov och finpolering
av cementspalt

Fluortackning

*1. Mjölkständer och kraftig fluoriderad emalj
skall utsas längre
Zinkphosphate cement

1. Clean surface with $\text{H}_2\text{O}_2$, wash, dry
2. Mix powder and liquid
3. Apply cement in crown
4. Place crown on prepared tooth
5. Wait
6. Remove surplus with probe
7. Inspect crown margin
Thank you for your kind attention