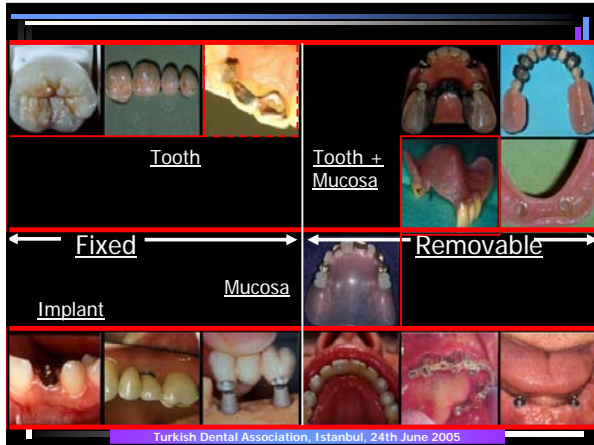


NEW MATERIALS AND TECHNIQUES IN PROSTHODONTICS

*Asbjørn Jokstad, Professor, Dr. Odont.
Department of Prosthodontics and Oral Function
Institute of Clinical Dentistry
University of Oslo, Norway*



New materials & methods

- Dental implants
- Articulators
- Precision attachments
- Repairs (Ceram fracture, crown removal, post retrieval, etc.)
- Denture fabrication: production, materials, lining & repairs
- Laboratory: process & new materials

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New materials & methods–Fixed prostheses

1. Rotating instrument
2. Root Post
3. Gingival retraction
4. Impression
5. Bite & jaw registration
6. Color shade
7. Temporary construction
8. Restorative materials
9. Production techniques
10. Cementation

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New materials & methods–Fixed prostheses

Preparation & 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

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New materials & methods–Fixed prostheses

Rotating instrument

Root Post

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

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1. Cast posts

Indirect technique

- Impression

Direct technique: Post & resin

- Wax
- Resin
 - Accuset
 - ExactaCast
 - Luminex
 - GC Pattern Resin



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2. Prefabricated posts

1. Cast Posts

- Indirect
- Direct: Post & resin

2. Prefabricated Posts

	Additional core	
Metal	No	Yes
Non-metal	-	Yes
		> 30 products

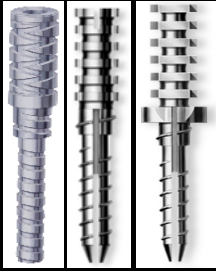
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"Core"-materials

Bis-core	Bisco	Dual co.	CuRay-support	Sci-Pharm	Dual co.
Bisfil core	Bisco	Light co.	Encore	Centrix	Chem.Co
Bisfil II	Bisco	Chem.Co	FluoroCore	Dentsply	Dual co.
Blue core	Teledyne	Chem.Co	Fuji-II LC	GC	GIC-modif.
Build-It! FR	Jeneric	Dual co.	HardCore	Pulpdent	Dual co.
Ceracap	Brasseler	ceramic	Infracore	Temrex	Dual co.
Clearfil Core	Kuraray	Chem.Co	Ketac silver	3M ESPE	Ag-GIC
" " PhotoCore	Kuraray	Light co.	Light-Core	Bisco	Light co.
Coradent	Vivadent	Chem.Co	LuxaCore Auto	DMG	Dual co.
Core Paste	Den-Mat	Chem.Co	MagnaCore	Bosworth	Dual co.
" " Syringe	Den-Mat	Dual co.	Microrest Core	GC	Chem.Co
Core-Flo	Bisco	Chem.Co	Parapost	Paracare	Coltene
CoreRestore2	sds/Kerr	Dual co.	Rebilda	VOCO	Chem.Co
" " HDOC	sds/Kerr	Light co.	Ti-Core	EDS	Chem.Co
CoreShade	Shofu	GIC	Vitremer	3M Espe	GIC-modif.

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2. Prefabricated posts, metal



Steel
Titanium-alloy
Titanium

"Active" – "Inactive"

Conical
Parallel
Steps
Slots & grooves

Threaded
Smooth
Structured

Flat
Conical
Ovoid

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2. Prefabricated post, non-metal

Five main groups

1. Ceramic, prefabricated
2. Ceramic, made in the dental laboratory



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Posts made in ceramics

Prefabricated

Biopost (Incermed), ZrOx, D, ~ 1990

Cerapost (Brasseler), 1995

Cosmopost (Ivoclar), 1998

Laboratory

+ "Cosmopuck" (Ivoclar), 1998

In-Ceram (VITA), 1994

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2. Prefabricated post, non-metal
 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"

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Non-metal, non-ceramic posts - many variants

Quarts
 Quarts+Zirkonium
 (Carbon)
 Quarts & Carbon

→ composite
 → "resin"
 → epoxi
 → polyester

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New materials & methods—Fixed prostheses

Rotating instrument
 Root Post

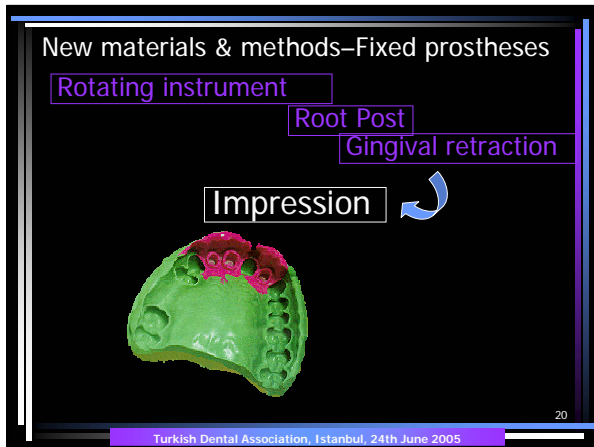
Gingival retraction

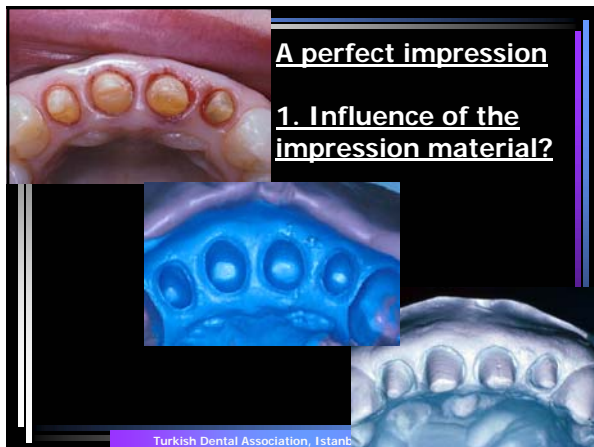
1. Cord
 - Impregnated
 - Non-impregnated
2. Gel/paste
3. Cotton
4. Electrosurgery
5. (Copper-tube)

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Most commonly used materials in USA

	Crowns /bridges	Inlays /onlays
Vinyl siloxane	81%	71%
Alginate	38%	20%
Polyeter	28%	22%


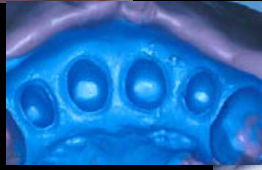
*Dental Products Report Survey, Nov 2000 n= 319 dentists₂₂

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A perfect impression

2. Influence of the impression technique?



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Method 1 - 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




Dual-arch

- Patient comfort
- Maximum intercuspид
- Easy for laboratory
- Time
- Occlusion?

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Method 2-
One polymerisation phase
- 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

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Method 3-
One polymerisation phase
- 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

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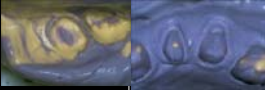
Method 4 –
Two polymerisation phases
-two viscosities

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


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Dual-arch	Single-phase	Two-phase	Two-phase - two stage
<ul style="list-style-type: none"> •Patient comfort •Maximum intercuspид •Easy for laboratory •Time 	<ul style="list-style-type: none"> •Fast 	<ul style="list-style-type: none"> •Hydraulic 	<ul style="list-style-type: none"> •Hydraulic
<ul style="list-style-type: none"> •Occlusion? 		<ul style="list-style-type: none"> •Putty : wash hardness compatibility? 	<ul style="list-style-type: none"> •Technique sensitive •Hydraulic •Replacement

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Alternative method 5 - "Hydraulic principle"


For upper anterior abutments with fragile gingiva



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Alternativ method 6 - "Laminar" principle
(Ref: G Schoenrock (1989))

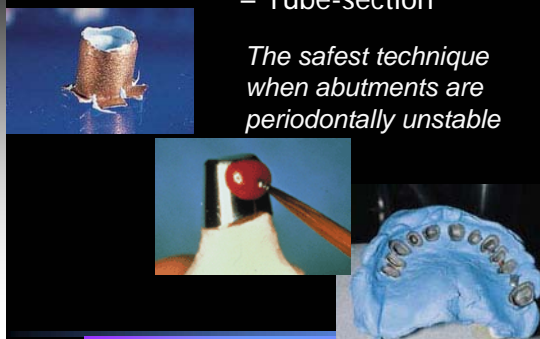
For lower posterior abutments with dry work field problems



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Alternative method 7
– Tube-section

The safest technique when abutments are periodontally unstable




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A perfect impression

3. Influence of the impression tray?

1. Dual-arch
 1. Metall
 2. Plastic
2. Other
 1. Metall
 2. Plastic
 3. Individual




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Trays – Dual-arch

- Bite Relator (Temrex)
- Bite Tray (Kerr)
- Exacta
- First Bite
- Quad-Tray
- Tri-Bite (Tri-Bite)
- Triple Tray (Premier)



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Trays - metal

Platinated brass
Steel
Titanium
Aluminium

Perforated
Uperforated

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Trays – metal

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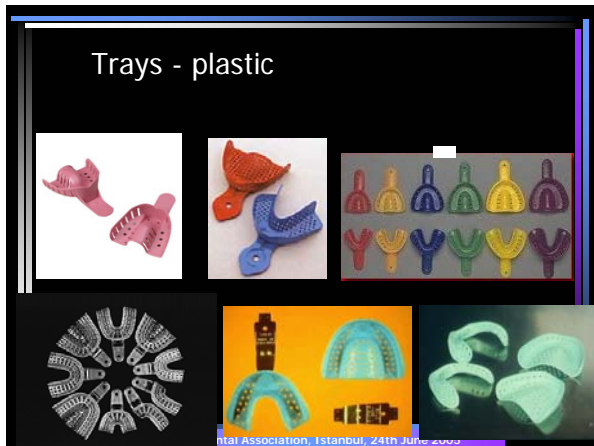
Trays – metal, for implant prosthodontics

WIN-TRAY

Kohler
Medizintechnik

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Most used in USA

Percent used for impressions

	Crowns /bridges	Inlays /onlays
Vinyl siloxane	81%	71%
Alginate	38%	20%
Polyeter	28%	22%

Do you ever use individual tray?
Yes 73% No 24%

*Dental Products Report Survey, Nov 2000 n= 319 dentists³⁸

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Tray - individual

Candulor C-plast	Candulor Dental	Chemical
Cavex Shellac	Cavex	Heat
Citotray	Bayer AG	Light
Comtray	Schütz Dental	Light
Easy Tray	Kerr	Heat
Erkolen	Erkodent	Heat/Vacuum
Extoral	Pro-Den	Light
Fastray	H Bosworth	Chemical
Formatray	Kerr	Chemical
Hygion	Premier	Chemical
Individo/Lux	VOCO	Chemical/Light
Ostron 100	G-C Dental	Chemical
Palatray/LC	Hereaus Kulzer	Chemical/Light
Pekatray	Bayer	Chemical
Spectra-Tray	Ivoclar	Light
SR-Ivolen	Ivoclar	Chemical
T-LUX	Scheu Dental	Light
TrayAcryl	Schütz Dental	Chemical
Triad	Dentsply	Light

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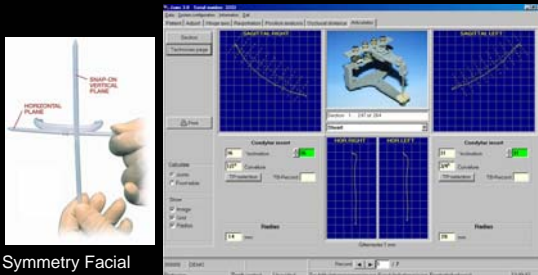
New materials & methods—Fixed prostheses

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



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Bite & jaw registration




Symmetry Facial Plane Relator

JAWS 3D

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New materials & methods—Fixed prostheses

- Rotating instrument
- Root Post
- Gingival retraction
- Impression
- Bite & jaw registration
- Color shade



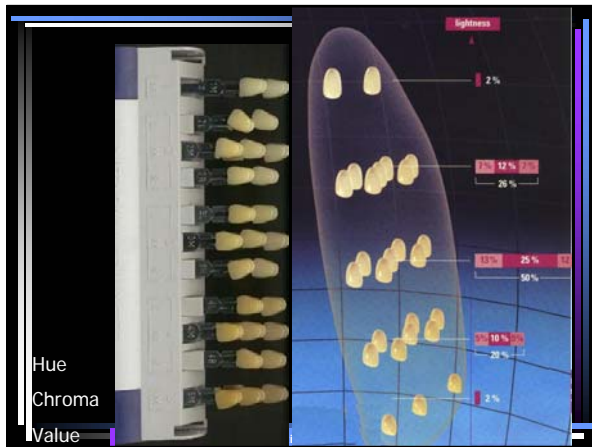
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Digital Shade Systems

- Dental Color Analyser (clearlight.com/~aei)
- Metalor-ikam system (metalor-ikam.com)
- Pocketspec (Pocketspec.com)
- ShadeVision /ShadeRite (X-Rite.com)
- Shadescan (Cynovad.com)
- Spectroshade (mhtint.com)
- ShadeEye NCC (Shofu.com)



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New materials & methods–Fixed prostheses

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



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Alternatives

- Bis-Acrylic 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?*

Self-cure bis-acryl resin	63%
Stock polycarbonate crowns	40%
PMMA/acrylic	34%
PEMA	21%
Microfill	16%
Ethyl vinyl methacrylate	8%
Light-cured composite	8%
Urethane dimethacrylate	5%
Thermoplastic	2%
Other	10%

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

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Chemical cured

Cool Temp	Coltene
Integrity	Dentsply
Luxatemp Automix	DMG
Protemp 3 Garant	3M ESPE
Structur 2	VOCO GmbH
Tempofit	Detax
Trim II H	Bosworth



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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?*

Zinc oxide eugenol	60%
Zinc oxide non-eugenol	50%
Resin	23%
Polyacrylate	23%
Other	14%

* Multiple responses accepted
Source: December 2002 ISPE
Temporary Restorations Survey

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New materials & methods—Fixed prostheses

Rotating instrument

Impression

Root Post


Gingival retraction

Bite & jaw registration

Color shade

Temporary construction

Restorative materials



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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 dentists₅₃

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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


Twinned₅₄

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New materials & methods—Fixed prostheses

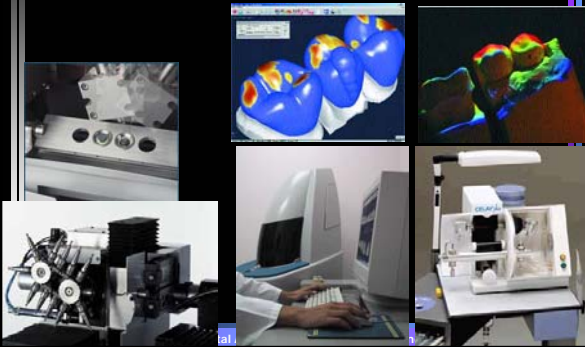
- Rotating instrument
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Production techniques




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Production techniques-
CAD-CAM (CAD-CAM)



Production techniques- CAD-CAM

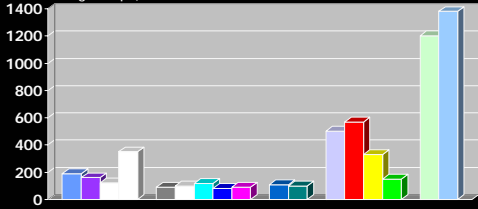
BEGO Manufacturing	BEGO Medical	(D)
CAD/CAM System	etkon	(D)
CELAY	Mikrona Technologie	(CH)
Cercon®	Dentsply/Degudent/Degussa Dental	(D)
CEREC3/CEREC Inlab	Sirona Dental Systems	(D)
CICERO®	Cicero Dental Systems	(NL)
DCS Precident	DCS Dental	(CH)
DECIM	DECIM	(S)
DENT. CAD/CAM GN-1	GC Corporation	(J)
digIDENT®	Girrbach Dental	(D)
Everest	KaVo Elektrotechnisches	(D)
Lava®	3M ESPE Dental	(D)
PRO 50	CYNOVAD SM	(Can)
Procera®	Nobel Biocare	(S)
WOL-CERAM	WDT-Wolz-Dental-Technik	(D)
Xawex	Arnold Wohlfend	(D)



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1. Development of materials, e.g Ceramics

(Tensile strength, Mpa)

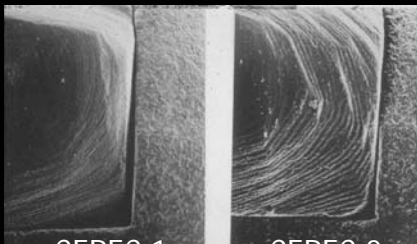


- Carrara Core
- Synspar
- Creation LF
- InCeram Spinel
- Lava 3M
- Optec OPC
- Vitadur Alfa
- VMK95
- Cerec Mark 2
- Empress
- Carrara Dentin
- InCeram Alum
- ZIOxide
- Empress2
- Vintage
- Duceram LFC
- InCeram Zirconia
- ZIOxide

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2. Development of software Time - precision



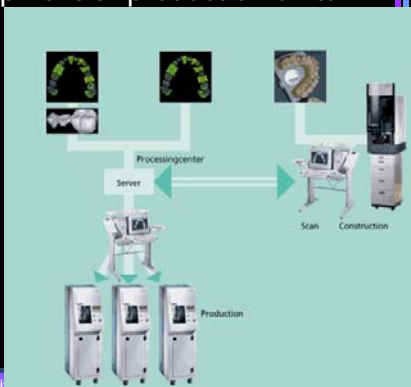
CEREC 1

CEREC 2

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3. Development of production units



Turki

New materials & methods—Fixed prostheses

- Rotating instrument
- Root Post
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- Restorative materials
- Production techniques

Cementation

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Water-based - conventional

PhosphoCEM IC

DC Dry Zinc

Durelon

Zinc-phosphate

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Water-based: Glassionomer

AquaCem

Vivaglass Cem

Ketac-Bond

PULPDENT

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Resinmodified GIC & polyacrylate modified resin

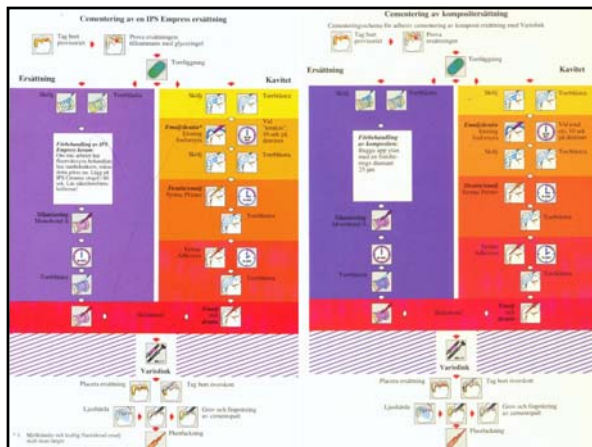


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REALITY'S CHOICES 2003

Resin Cements

Light-Cured/Dual-Cure	Dual-Cure-Only	Self-Cure
1. Insure/Insure Life Cosmedent	1. Panavia F Kuraray	1. Panavia 21 Kuraray
2. Variolink II Ivoclar Vivadent	2. RelyX ARC 3M ESPE	2. Post Cement HI-X Bisco
3a. Nexus2 sds/Kerr	3. Bistite II DC Tokuyama Soda/ J. Morita USA	3a. C & B Metabond Parkell
3b. RelyX Veneer Cement 3M ESPE	4. Duo-Link Bisco	3b. M-Bond Tokuyama Soda/ J. Morita USA
4a. Choice Bisco	5a. Cement-It! Universal C & B Pentron	4. C&B Cement Luting Composite Bisco
4b. Illusion Bisco	5b. PermaFlo DC Indirect Luting/Restorative Resin Ultradent	
5. Calibra Dentsply/Caulk		



Zinkphosphate cement

1. Clean surface with H_2O_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

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Thank
you for
your
kind
attention
