IN-OFFICE CAD/CAM

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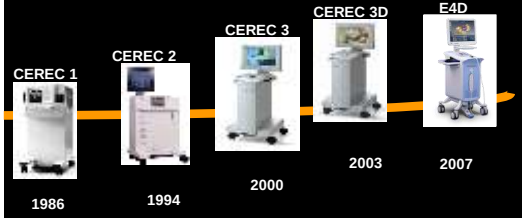
- Thank you to Kuraray and Sullivan-Schein for sponsoring my lecture

- Handouts at www.drjavaheri.com
  - Go to handout tab and download CAD/CAM

The Evolution of chairside CAD/CAM

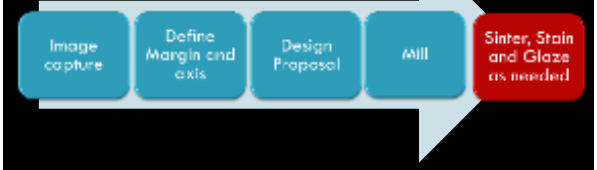
- **1986: Sirona introduces CEREC 1, the world's first digital impression system and all-ceramic, single-visit chairside CAD/CAM restoration system.**
- **CEREC 1 was able to produce inlays and veneers.**



Why now is the time for in-office CAD/CAM?

1. Technology has advanced significantly
   1. And is rapidly improving

CEREC and E4D both use same basic workflow



CEREC Bluecam Technology Overview

- One of the biggest advances for CEREC.
- Improved depth of field and precision.
- Uses a highly visible blue light LED (light-emitting diode) to capture the image.
- Still requires powder but less than before.
- Top down images only.
- Bulky

CEREC imaging

Video from Sirona

E4D IntraOral Digitizer

- Laser and image-based scanning
- No powder*
- HD scanner
- High-speed data capture
- Can scan teeth, model, or impression
- Requires 9 minimum images
- Bulky

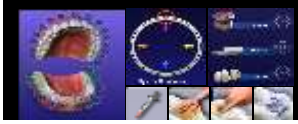
*Requires contrast agent for gold or very white restorations

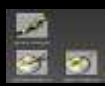
E4D Scanner

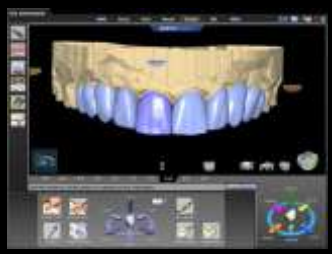
SCAN

E4D Restoration Design 2.0

- At a dental assistant level
- Anatomical library or clone option
- Occlusion and contact controls
- Easy to use shaping tools
- Many options to achieve the same thing
- Customized design
- Intuitive icons





CEREC 4.0 software

Biogeneric design

Simplified and more user friendly

Incorporated many features of E4D software

Restoration Proposal

CEREC Milling

- MC – L
  - Original mill
- MC XL
  - Faster, more precise, lower noise
  - 5 minute mill time

E4D Milling Center

- Low vibration
- Standard and detail mode
- Built with the future in mind
- Slower mill time than MC XL
  - 10 minute for Empress
  - 20 minute for E-max
- Stronger restoration than MC XL*
  - Empress 6% stronger
  - E-max 9% stronger

* CRA Oct 2009

E4D mill

E4D vs. CEREC

- Both can give same end result.
- Depends which features are more important to you
- Technology is rapidly advancing

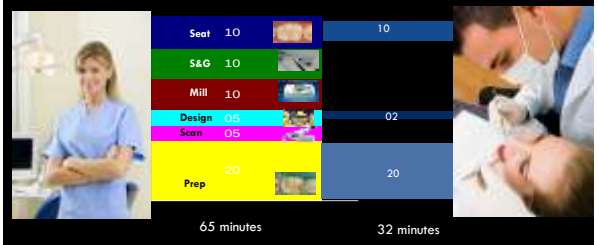
Why now is the time for in-office CAD/CAM?

1. Technology has advanced significantly
2. 1 appointment restoration

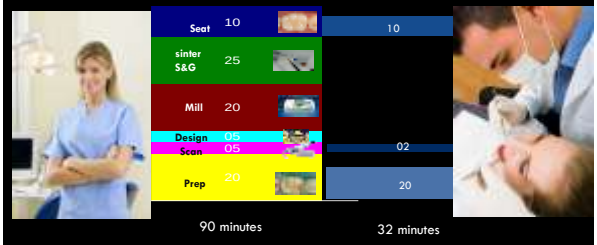
Healthier dentistry

- Immediate sealing
- No temporary for two weeks
  - Leakage
  - Flexing

E4D Production cycle for Empress



E4D Production cycle for E-max



15 Minute – anesthesia, trim tissue, prep
2 minutes – scan
10 min- Design

25 minutes – mill
20 minutes – try-in, stain, glaze
10 minutes – cementation
Total – 1 hour 22 minutes

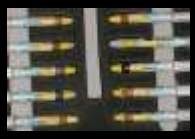
Why now is the time for in-office CAD/CAM?

1. Technology has advanced significantly
2. 1 appointment restorations
3. Improved materials

Empress Multi Block (Ivoclar)

- Improved esthetics

Stain and glaze




Glaze

- Glaze is 25-100 microns of melted porcelain
- Without it
  - Surface roughness
  - Plaque accumulation
  - Tissue inflammation






IPS e.max CAD (Ivoclar)

- Strong - Lithium disilicate
- Good shading-
  - high and low translucency versions
  - Impulse version has 3 value and 2 opal Shades
- Indications
  - Veneers and crowns
  - implant crown

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4. This is what labs are using

Why now is the time for in-office CAD/CAM?

1. Technology has advanced significantly
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3. Improved materials
4. This is what labs are using
5. "Keeping up with the Jones"

Ideal Crown Preparation

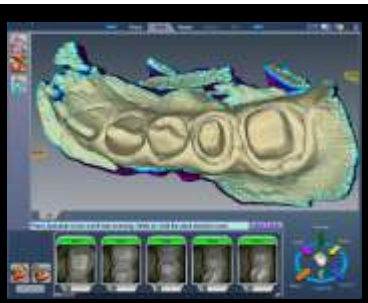
Ideal Anterior Preparation

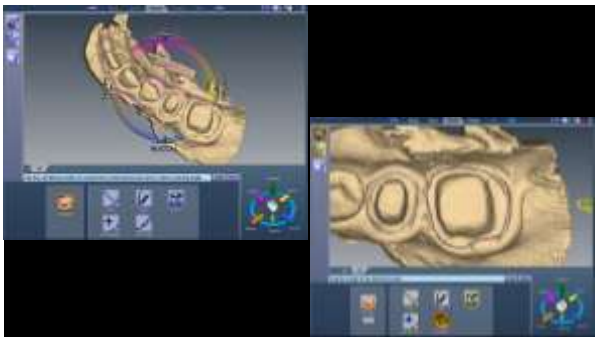
#19 and 20 full crowns

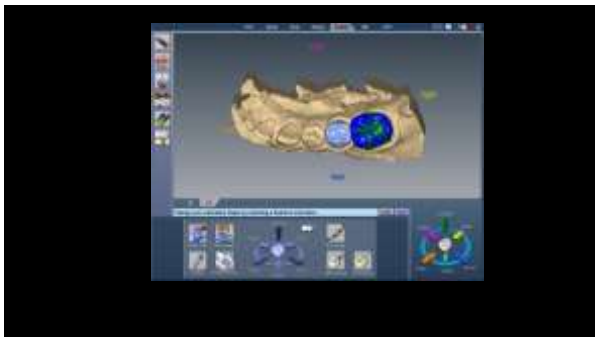
- #19 has a temporary crown
- She is getting food impaction between 19 & 20.

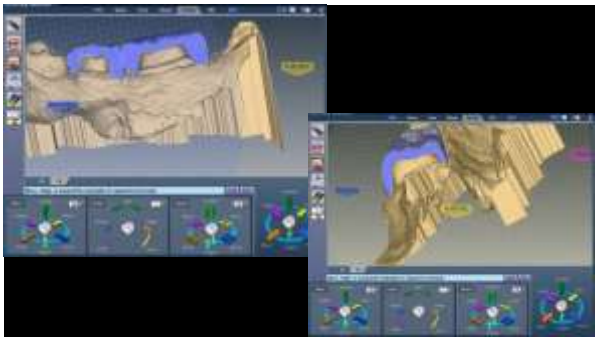
Preparation

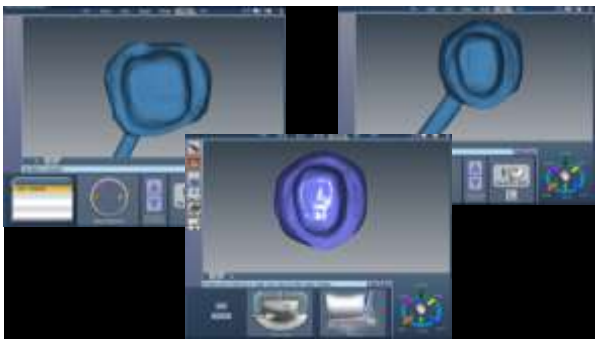
- Occlusal reduction 1.5-2mm
- 1-1.5mm reduction all around
- Margins should be deep chamfer or shoulder
- >6° taper of axial walls
- Rounded angles on incisal, occlusal and shoulders

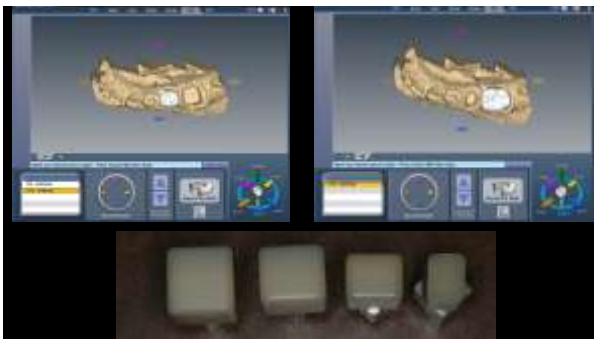






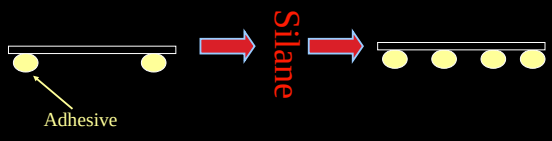






Silane on restoration

- Increases "wettability"
- Increases bond strength



CLEARFIL CERAMIC PRIMER (Kuraray)

- Fast and easy to use
- No bonding agent needed
- 2 year shelf-life

Self Adhesive Resin Cements

Advantages	Disadvantages
▪ High strength ▪ Adhesion ▪ Easy to use ▪ Light or dual cure ▪ No solubility ▪ Can cement everything	▪ Color change – do not use with translucent porcelain. ▪ Adhesion weaker than some other resin cements ▪ High cost

Clearfil SA cement (Kuraray)

- Self adhesive resin that is dual cure
- No post of sensitivity from cementation
- Strong bond
- Easy to clean excess
- Fluoride release

Pt presented with fractured crown

Was hit in the mouth with a ring (by accident) while dancing.

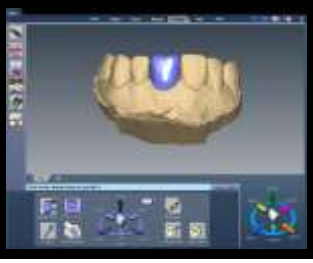
Added composite to fractured area to facilitate in design using clone option

Scan of pre-op clone

Crown prep

Scan of prep

Initial design from clone



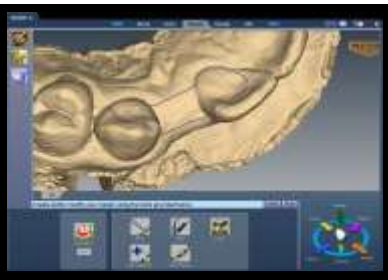
Final design

Try in after mill

After stain, glaze and final cementation

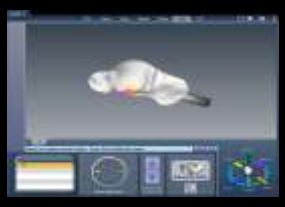
15 year old girl just out of orthodontics is missing #10. The goal is to get her an implant in about 3 years. We need an esthetic long term temporary…

Scan her in



Outline "margins"

Design Framework for bonded bridge

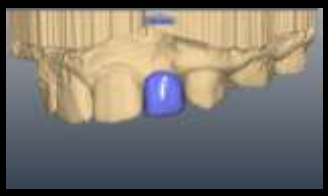


Make framework out of composite block so it can flex with adjacent teeth.

Framework Cemented and reshaped a little like a veneer prep

Scan it in and its like making a veneer from here on

Design



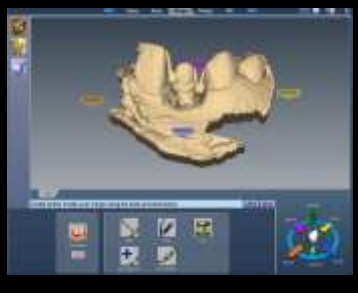
I made it a little larger. So I could do the final contours by hand.

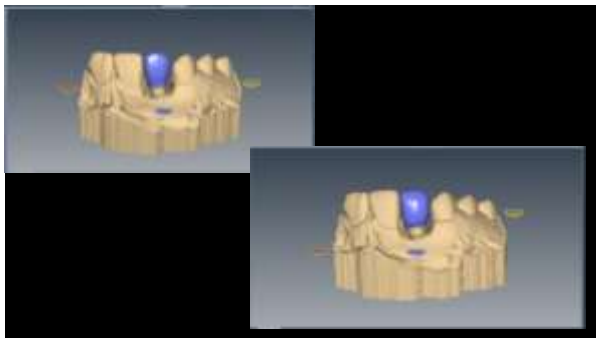
Final shape

Final restoration with some white spots added in and glaze

Internal view

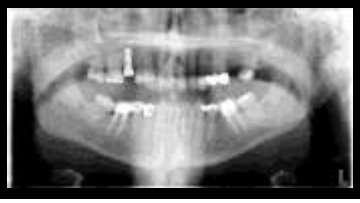
Implant #7





Zirconium abutment + Empress = success

6 months ago, patient missing tooth #4 wants an implant.



Pre-op photo prior to restorative phase.

Abutment selected for collar to be about 1 mm bellow tissue level. The abutment is fully seated and finger tightened.

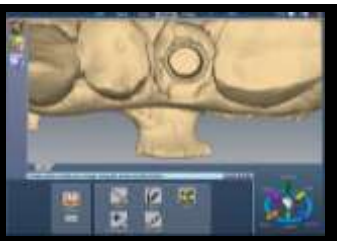
Transfer coping is placed and impression taken

The abutment removed, connected to an analog and placed into impression

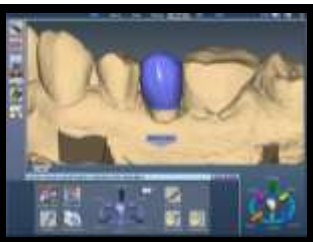
To create a soft tissue model effect some extra impression material is added around the abutment and analog. This will assist in scanning, esthetics and emergence profile.

Poured up model with impression material replacing soft tissue

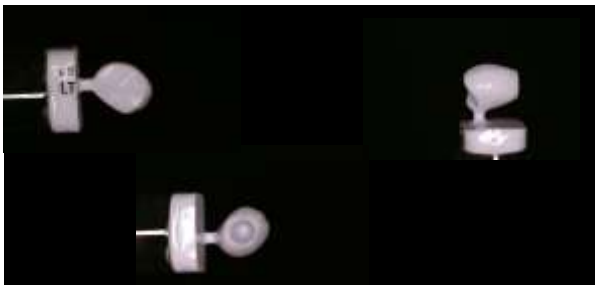
Pealed out surrounding impression material to give clear access to abutment for scanning



Plugged up the hole with some silly putty (courtesy of my 5 year old). Easy to scan, easy to remove. Then scanned into E4D



Final Design



Milled out low translucency e-max with E4D

Checking the fit and margins on the abutment and a spare analog

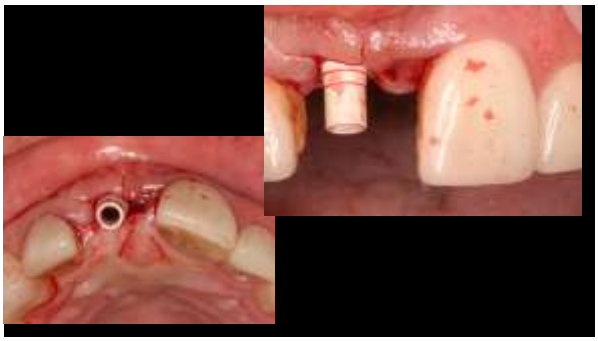
Checking the contacts on solid model

Glaze and bake!

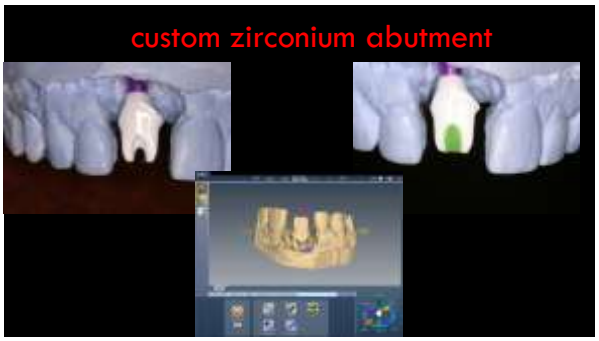
Re-inserted impression material that will serve as soft tissue model to evaluate emergence profile and interproximal spaces.

Abutment torqued in. Implant is 4.7mm body, 4.3mm platform. You can see platform switching effect on x-ray.

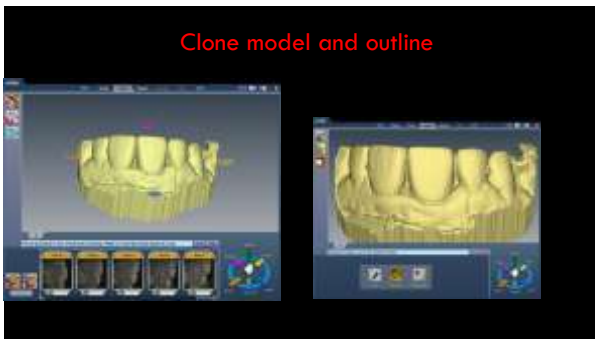
Implant crown cemented in. Note shade is matching to newer crowns from 6-11, not to old adjacent crowns.



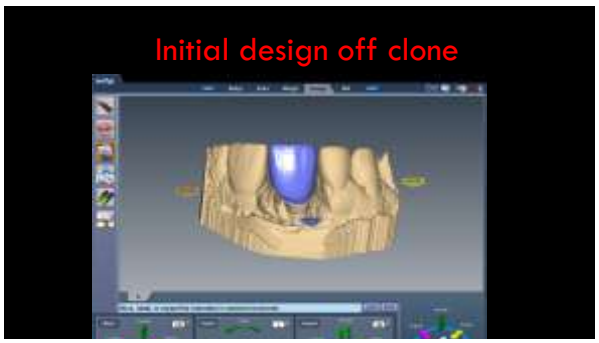
custom zirconium abutment



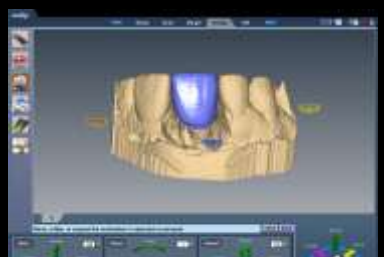
Clone model and outline



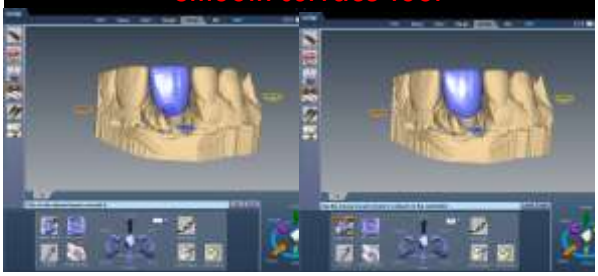
Initial design off clone



Shortened incisal, extended distal rubber finger mesial cervical

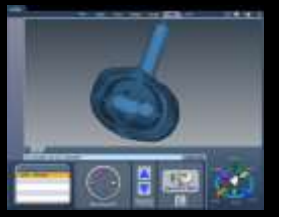


Smooth surface tool

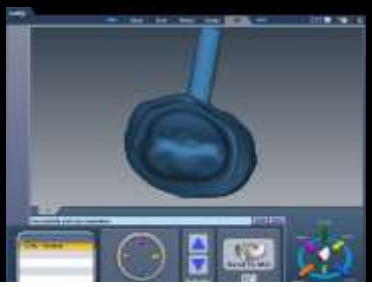


Sim on standard mode - Overmill

- Overmill reduces thickness of crown may lead to fractures if crown gets thin in that area

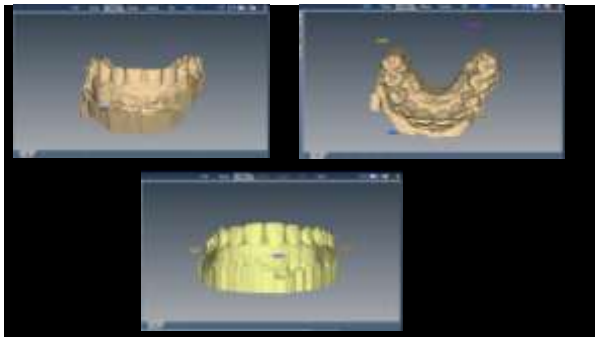


Sim on detail mode or increased spacer



Shade A1

with blue toward incisal and A2 in cervical/interproximal

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E4D
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