

“Intra O

DİJİ



ayıcılar

İĞİ

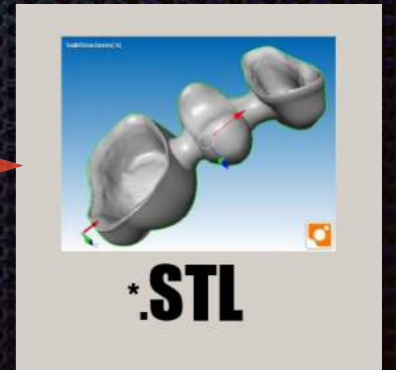
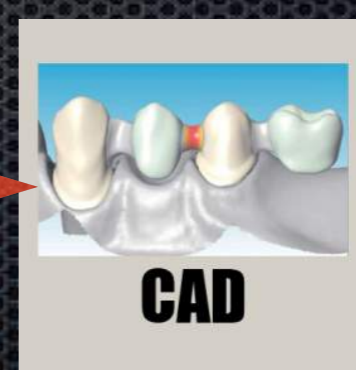
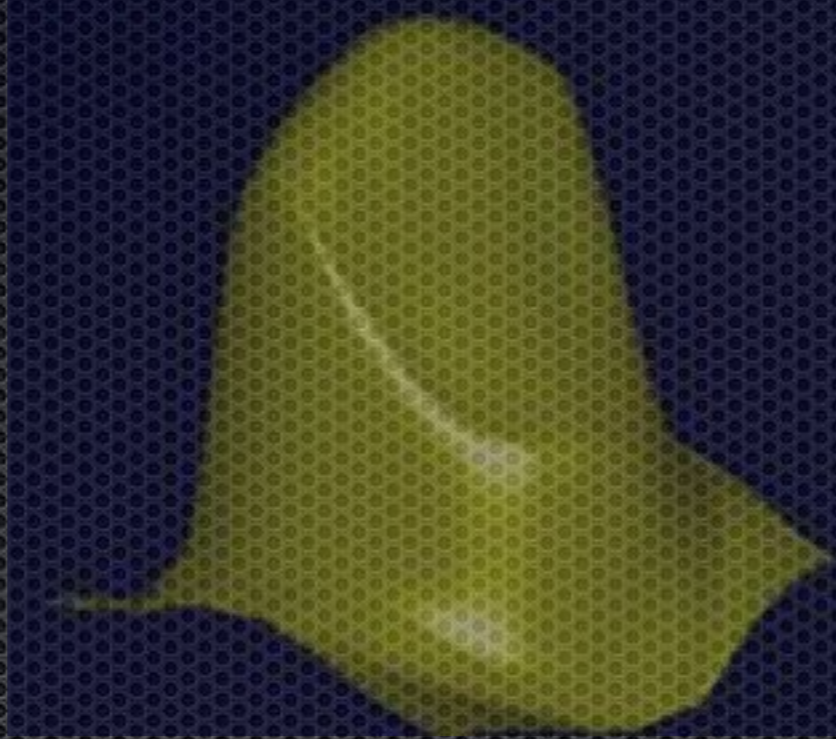
Prof. Dr. Mustafa ZORTUK  
HATAY MUSTAFA KEMAL ÜNİVERSİTESİ  
DİŞ HEKİMLİĞİ FAKÜLTESİ

“Dijital Diş Hekimliği 1980’li yıllarda CEREC teknolojisi ile başladı”

Taramak, dijital görüntü elde etmek ve tek bir diş restorasyonu üretmek, tam olarak dijital üretim,  
İlk olarak 2003 yılında gerçekleşti.

CAD Modülleri

Intraoral scanner  
Optik Ölçü  
Pozitif Model



TARAMA

DİZAYN

ÜRETİM



# Intra Oral Scanner (IOS)

## “Ağız içi tarayıcılar”

- (1) CEREC – by Sirona Dental System GmbH (Germany)
- (2) iTero – by CADENT Ltd (Israel)
- (3) E4D – by D4D TECHNOLOGIES, Llc (USA)
- (4) LavaTMC.O.S. – by 3M ESPE (USA)
- (5) IOS FastScan – by IOS TECHNOLOGIES, Inc. (USA)
- (6) MIA3dTM – by Densys3D Ltd (Israel)
- (7) DPI-3D – by DIMENSIONAL PHOTONICS INTERNATIONAL, Inc. (USA)
- (8) 3D Progress – by MHT S.p.A. (Italy) and MHT Optic Research AG (Switzerland)
- (9) directScan – by HINT – ELS GmbH (Germany)
- (10) trios – by 3SHAPE A/S (Denmark)
- (11) Bluescan-I – ATRON3D GmbH (Austria)
- (12) Planscan – Planmex (USA)
- (13) Condor – Remond (USA)
- (14) CS 3500 – Carestream (USA)
- (15) Diglmpriint – Sirona (Germany)

Optics and Lasers in Engineering 54 (2014) 203–221

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journal homepage: [www.elsevier.com/locate/optlaseng](http://www.elsevier.com/locate/optlaseng)



# Dijital ölçü verilerinin transfer sistemleri



## AÇIK SİSTEMLER

Universal stl kullanılır. Klinik içinde, dışında veya yurt içinde-yurt dışında üretmek mümkündür.



## TESCİLLİ SİSTEMLER

Farklı formatta kayıt edilir. Sistem dışında üretimi yapılamaz.

## AÇIK SİSTEMLER “STL”

- CS 3500 Carestream Health Inc
- E4D Dentist E4D Techn.
- FastScan “IOS Technologies, Inc”
- iTero (1st generation) Align Technology Inc
- IOS FastScan IOS Technologies, INC. (US)
- Bluescans-I ATRON3Ds GMBH (AT)

## TESCİLLİ SİSTEMLER “ASCII , vb...)

- CERECsAC- Bluecam Sirona DentalSystem GMBH (DE)
- CEREC Omnicam “Dentsply Sirona”
- iTero (1st generation) Align Technology Inc
- Lava™C.O.S. 3MESPE(US)
- TRIOS (2nd generation) 3shape A/S
- PlanScan Planmeca
- True Definition (Gold-nine version) 3M ESPE
- MIA3d™ Densys3D LTD.(IL)
- trios 3Shape A/S (DK)



# Intraoral Scanner



- ✦ AWS (Active Wavefront Sampling)
- ✦ Confocal Technology
- ✦ Optical coherence tomography (OCT)

Journal of Healthcare Engineering  
Volume 2017, Article ID 8427595, 9 pages  
<https://doi.org/10.1155/2017/8427595>

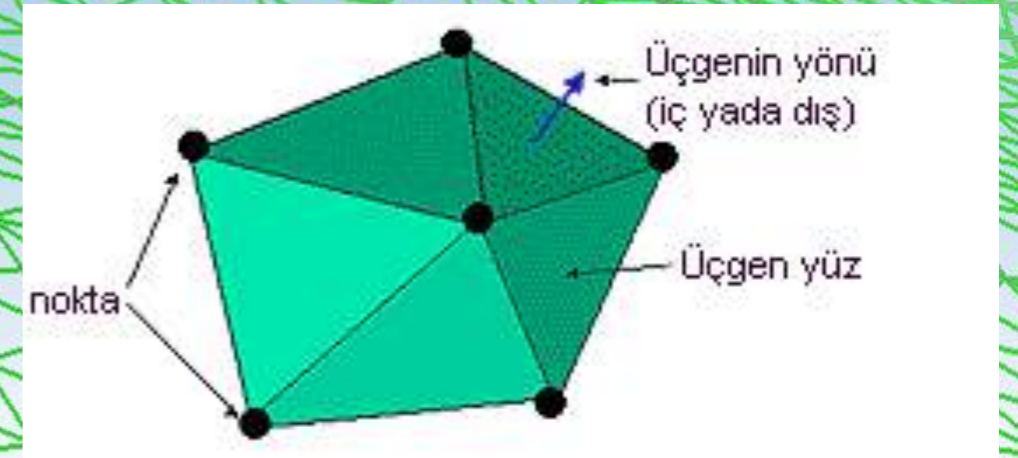
## Review Article

### Intraoral Scanner Technologies: A Review to Make a Successful Impression

Raphaël Richert,<sup>1,2</sup> Alexis Goujet,<sup>1,2</sup> Laurent Venet,<sup>1,2</sup> Gilbert Viguie,<sup>1,2</sup> Stéphane Viennot,<sup>1,2,3</sup> Philip Robinson,<sup>2</sup> Jean-Christophe Farges,<sup>1,2,5</sup> Michel Paves,<sup>6</sup> and Maxime Ducret<sup>1,2,5</sup>

<sup>1</sup>Faculté d'Odontologie, Université Lyon 1, Université de Lyon, Lyon, France

STL: 3D geometriyi birbirine baęlı üçgen řeklindeki düz yüzeylerle ifade eden bir formattır.





## Active Wavefront Sampling

- CEREC Omnicam  
“Dentsply Sirona”
- FastScan “IOS  
Technologies, Inc”
- True Definition  
(Gold-nine version)  
3M ESPE
- PlanScan Planmeca
- CS 3500  
Carestream Health

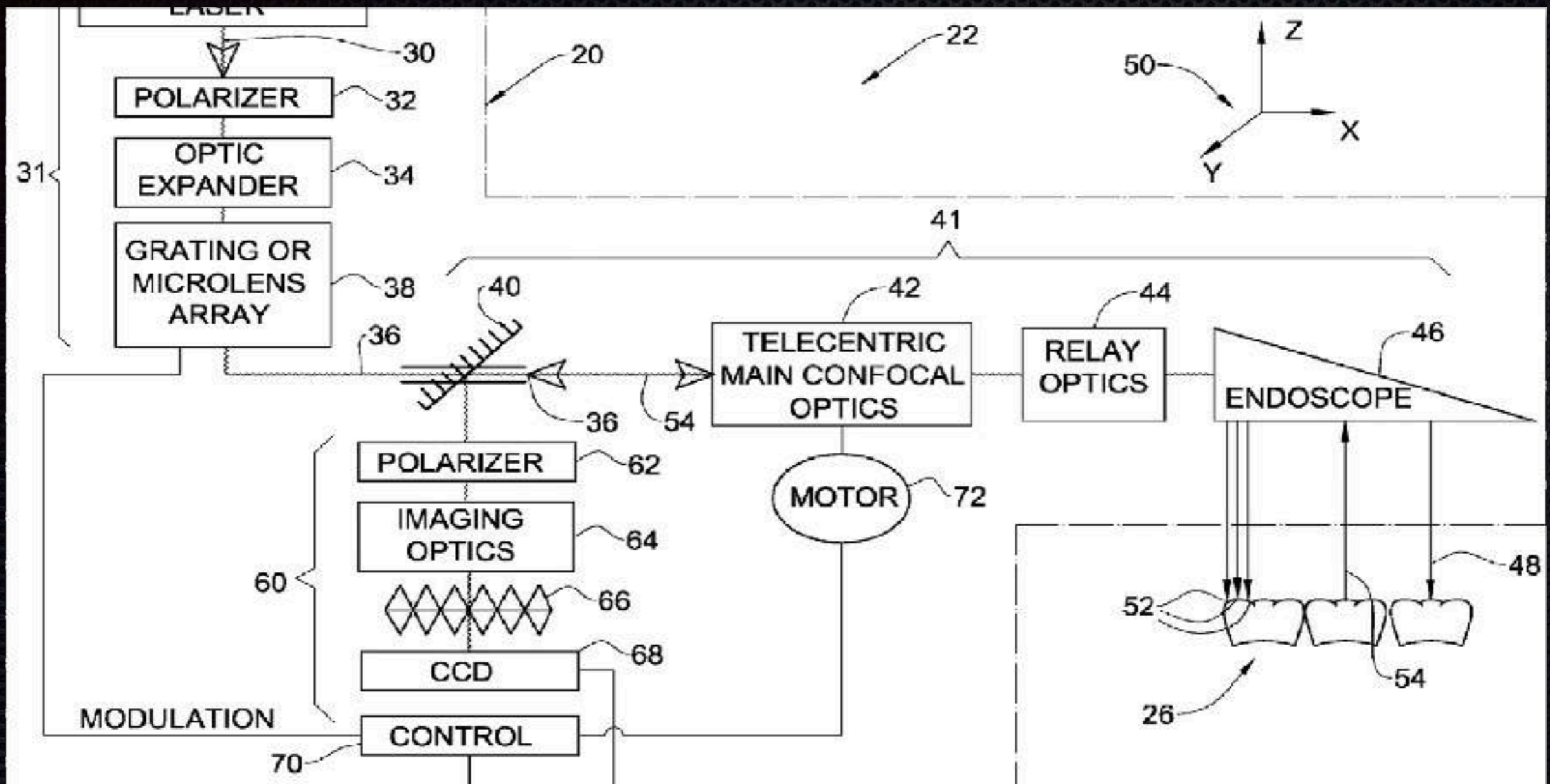
## Confocal Technology

- TRIOS (2nd  
generation)  
3shape A/S
- iTero (1st  
generation)  
Align  
Technology Inc

## Optical coherence tomography

- E4D Dentist  
E4D Techn.





iTero scanning system



## 3M™ True Definition Scanner, 78011

Catalog Number 78011, 3M ID 70201095349

★★★★☆ 3.7 (11) [Write a review](#)



★★★★☆ Dr C · a year ago

### Don't buy

Worst purchase I've made in 35 years of practicing dentistry! From installation, training, and performance; it's been a nightmare. 3M is not very accommodating - it's like "tough break". To make things worse you have data charges every month. Must pay extra to do scans for Invisalign. The powder is a pain to work with!!!

**Incentivized Review** No

No, I do not recommend this product.

Helpful?

Yes · 7

No · 0

[Report](#)

Quality of Product



Value of Product



★★★★☆ LDDS · a year ago

### Not a good investment

I purchased this scanner in hopes of reducing cost and saving time. We followed all of the recommendations made during training and after training. We completed 85 cases. 26 of those cases had to be remade due to unacceptable fit. 12 of those cases resulted in the patient not returning. Our crown seat appointments customarily scheduled for 30 minutes required 1 hour or more. I worked with 3M extensively to achieve a better outcome. Unless you are willing to prep a supragingival crown margin across the board, this scanner will not benefit you. I am still paying for this equipment, 3M is fully aware of the problems I had, and they blamed them on software glitches and operator error. They proposed a work around to my lab of outsourcing the task of margin marking to a 3rd party instead of using 3M's software without ever disclosing this to me. We did not save money, we did not save time. The crowns we produced that could be seated were barely acceptable. We lost patients.

Quality of Product



Value of Product



**Incentivized Review** No

# Dijital Ölçü

Yüzeylerden homojen bir yansımaya elde etmek için bazı sistemler yansıtıcı toz (Titanyum oksit) kullanır.



“Accuracy consists of precision and trueness”  
(ISO 5725-1).



Tekrarlanan taramalarda,  
aynı sonuçlar alınması.  
Precision-Predictable



Gerçek boyut ile dijital boyut  
arasındaki boyutsal benzerlik

# Necessity of coating



EVET

- FastScan-IOS Techn.
- E4D Dentist-E4D Techn.
- True Definition (Gold-nine version) 3M ESPE

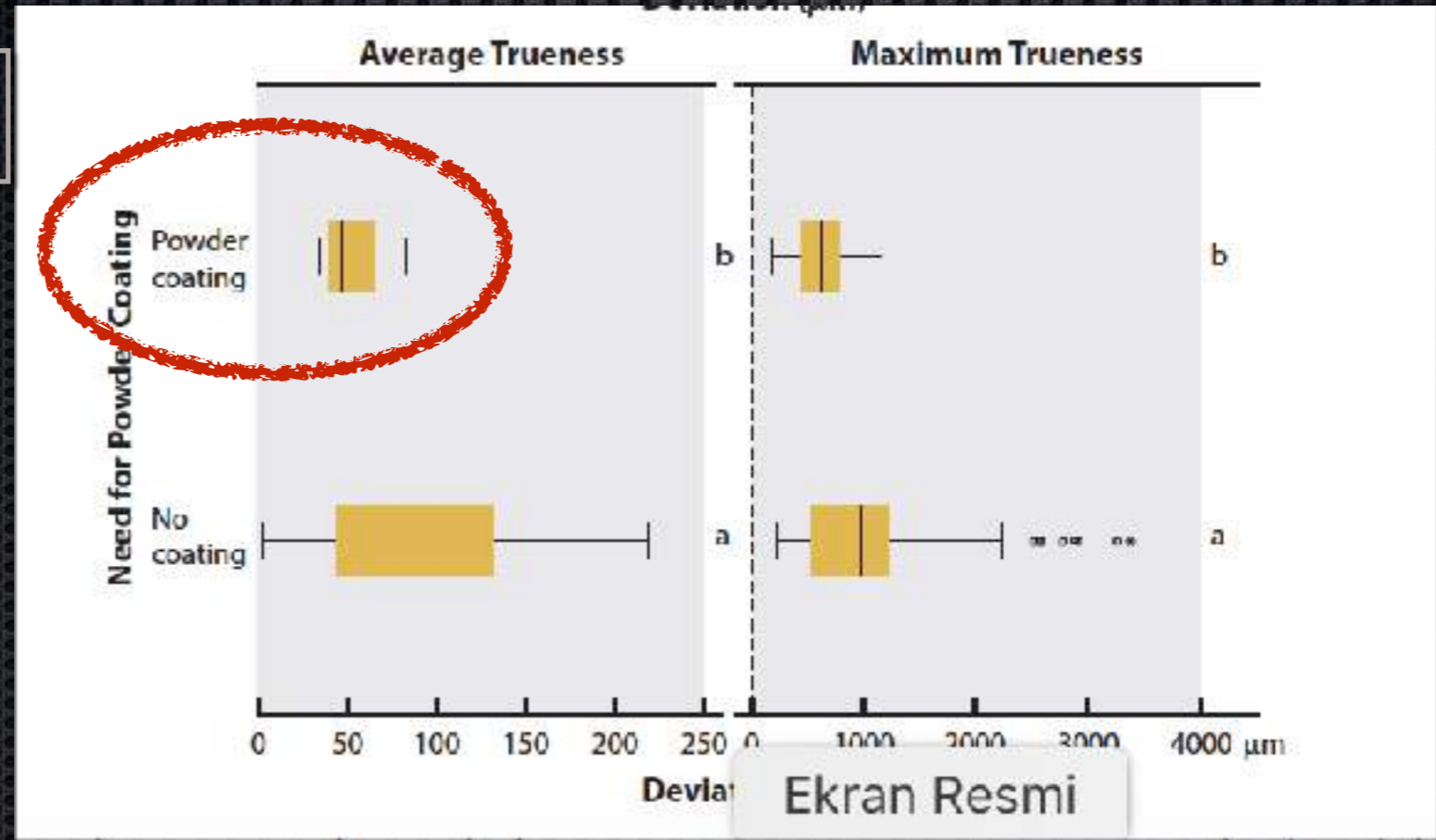


HAYIR

- CEREC Omnicam Dentsply Sirona,
- iTero (1st generation) Align Technology Inc,
- PlanScan Planmeca Oy
- TRIOS (2nd generation) 3shape A/S
- Zfx IntraScan Zfx GmbH

13 to 85 mikrometre.

- Toz kaplama yapılarak, daha iyi sonuçlar elde edildiği rapor edilmiştir.



JPD  
THE JOURNAL OF PROSTHETIC DENTISTRY

RESEARCH AND EDUCATION

Accuracy of 9 intraoral scanners for complete-arch image acquisition: A qualitative and quantitative evaluation

Ryan Jin-Young Kim, BDS, MSc, PhD,<sup>a</sup> Ji-Man Park, PhD,<sup>b</sup> and June-Sung Shim, DDS, PhD<sup>c</sup>

With the advancement of computer-aided design and computer-aided manufacturing (CAD-CAM) technology, digital

ABSTRACT

**Statement of problem.** Different intraoral scanners (IOSs) are available for digital dentistry. However, information on the accuracy of various IOSs for complete-arch digital scans is limited.

**Purpose.** The purpose of this in vitro study was to evaluate the trueness and precision of complete-

“Kim ve arkadaşları, toz boya gerektiren **CEREC AC** sistemlerini kullanarak 1251 klinik dijital taramayı analiz ettiler. Dijital tarama prosedürleri sırasında en sık rastlanan hatayı, toplam hataların % 21,1'ine katkıda bulunan düzensiz bir toz düzenlemesi olduğunu buldular. Bu nedenle, yetersiz veya aşırı uygulamadan kaçınmak için toz dikkatlice uygulanmalıdır.”



*Kim JH, Kim KB, Kim SH, Kim WC, Kim HY, Kim JH. Quantitative evaluation of common errors in digital impression obtained by using an LED blue light in-office CAD/CAM system. Quintessence Int 2015;46:401-7.*



# LIGHT SOURCE

## Light

- CEREC Omnicam  
“Dentsply Sirona”
- CS 3500  
Carestream Health  
Inc
- TRIOS (2nd  
generation) 3shape  
A/S
- True Definition  
(Gold-nine version)  
3M ESPE

## Laser

- E4D Dentist E4D  
Techn.
- FastScan “IOS  
Technologies, Inc”
- PlanScan  
Planmeca

## Red Laser

- iTero (1st  
generation) Align  
Technology Inc

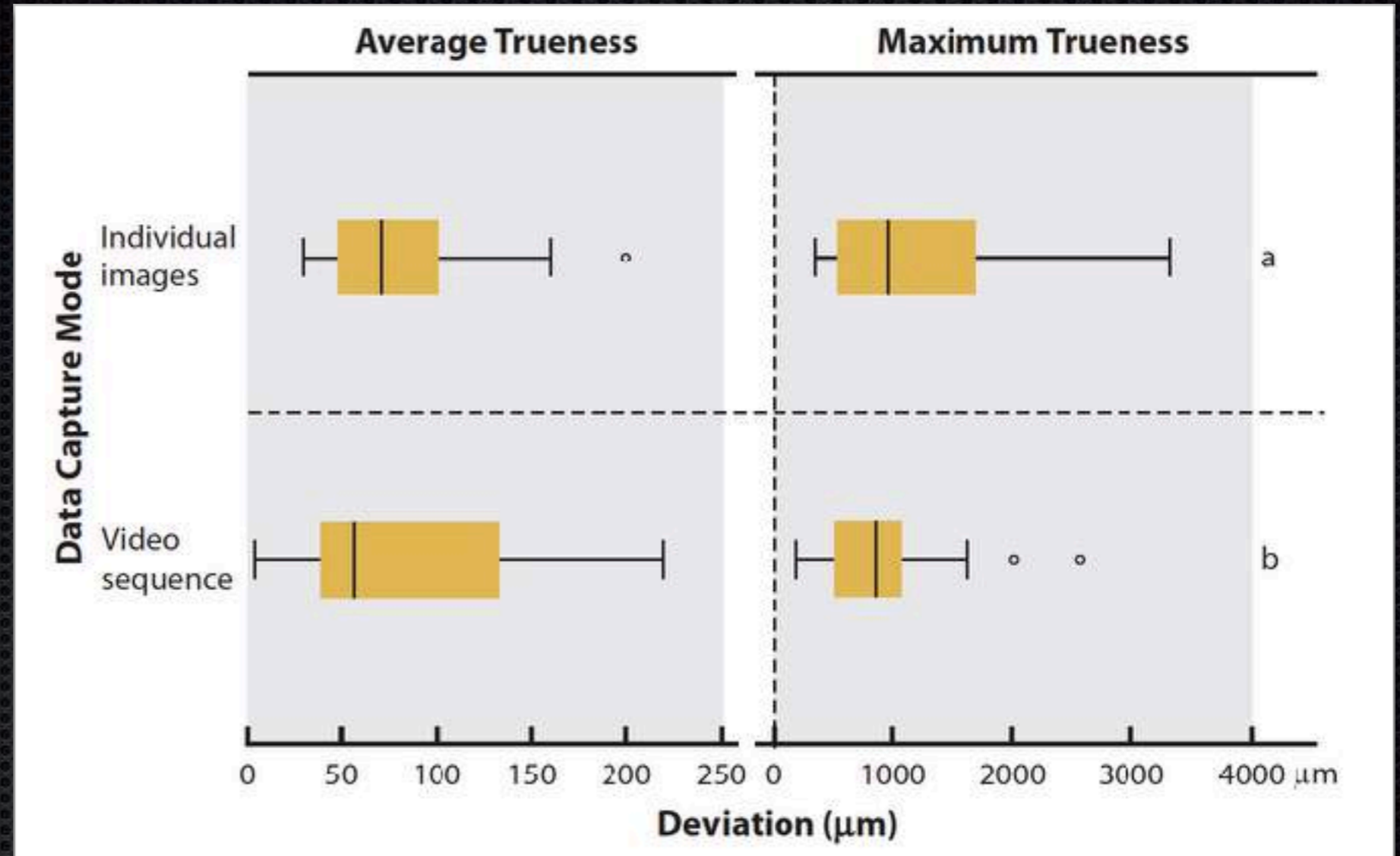
## Individual image

- CS 3500 Carestream Health Inc
- E4D Dentist E4D Techn.
- FastScan "IOS Technologies, Inc"
- iTero (1st generation) Align Technology Inc

## Video sequence

- CEREC Omnicam "Dentsply Sirona"
- TRIOS (2nd generation) 3shape A/S
- PlanScan Planmeca
- True Definition (Gold-nine version) 3M ESPE

Tek tek görüntü ve video dizisi modları arasındaki ortalamada istatistiksel olarak fark bulunmadı ( $p > 0.05$ )



**JPD**  
THE JOURNAL OF PROSTHETIC DENTISTRY

RESEARCH AND EDUCATION

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Patzeldt ve arkadaşları

Ender A, Mehl A.

CEREC Bluecam



iTero



Lava COS



Zfx IntraScan



Dijital Ölçü



Geleneksel Ölçü

-Ender A, Mehl A. In-vitro evaluation of the accuracy of conventional and digital methods of obtaining full-arch dental impressions. Quintessence Int 2015;46:9-17.

-Patzelt SB, Emmanouilidi A, Stampf S, Strub JR, Att W. Accuracy of full-arch scans using intraoral scanners. Clin Oral Investig 2014;18:1687-94.

E4D

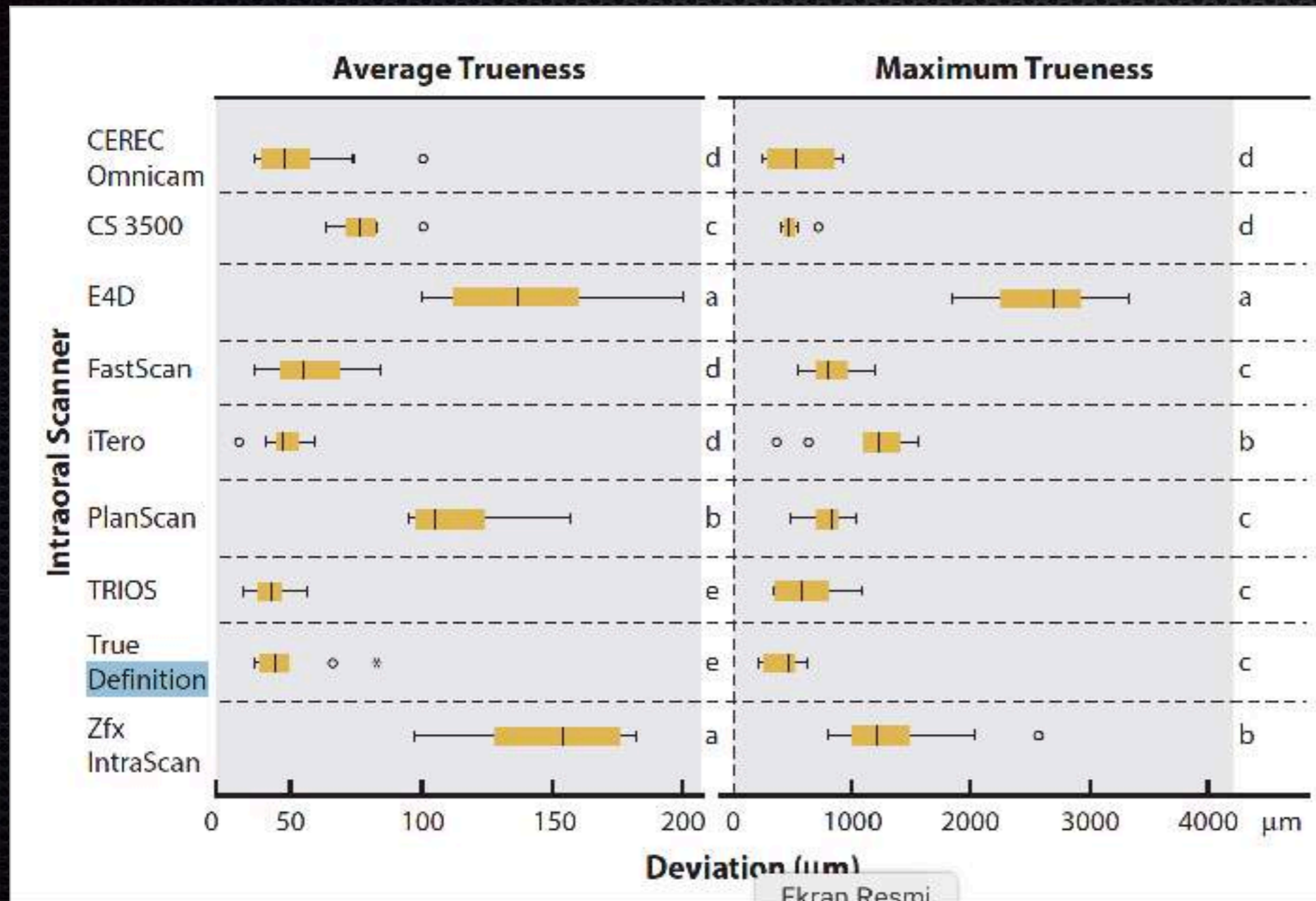


ZfxScan

iTero

TRIOS

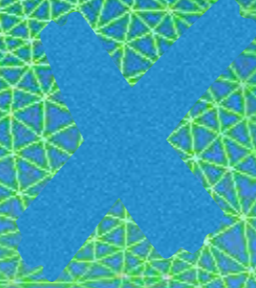
True Definition



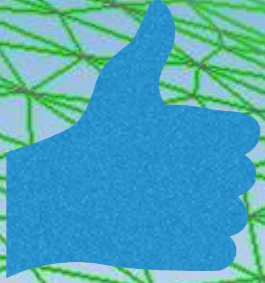
FastScan  
PlanScan



**Daha fazla poligon**



**Daha iyi model**



**Poligonların özdeş boyutu  
&  
Şekli**



RESEARCH AND EDUCATION

Accuracy of 4 digital scanning systems on prepared teeth  
digitally isolated from a complete dental arch

Priscilla Medina-Sotomayor, PhD,<sup>1</sup> Agustín Pascual-Moscardo, DMD,<sup>2</sup> and Isabel Camps A, DMD<sup>3</sup>

- TRIOS (software v1.4.5.3, 3Shape Dental Systems),
- iTero (software OrthoCAD 5.7.0.301 CadentLTD),
- Cerec AC Omnicam (software CEREC SW 4.4.4; Dentsply Sirona),
- True Definition (software v4.2; 3M ESPE Dental Products)

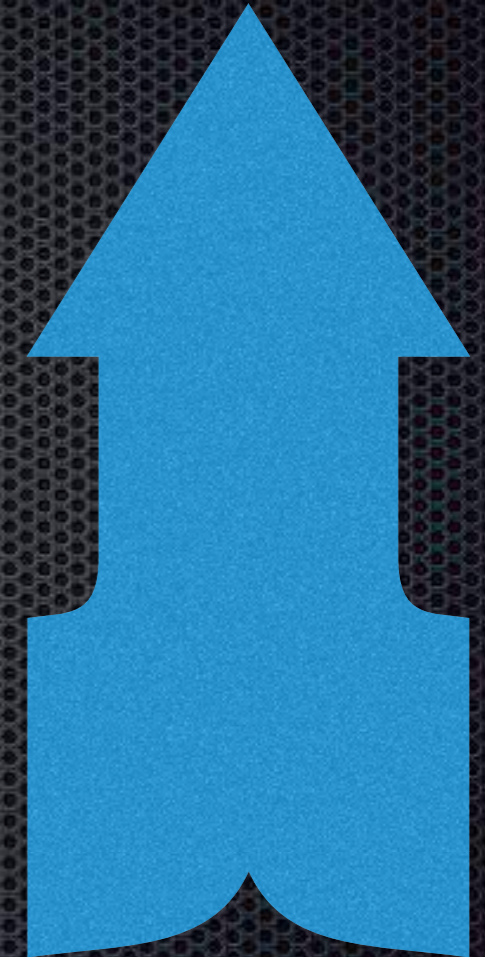


True Definition 3MESPE

TRIOS 3Shape

Cerec AC Omnicam Dentsply Sirona

iTero OrthoCAD



**Table 4.** Accuracy ( $\mu\text{m}$ ) in terms of trueness and precision and significant post hoc comparisons of digital scanning systems tested on complete dental arch and digitally isolated tooth preparations

Digital Scanning Systems	Arrangement											
	CDA		SM		FM		FP		FDP		CI	
	Trueness	Precision	Trueness	Precision	Trueness	Precision	Trueness	Precision	Trueness	Precision	Trueness	Precision
TRIOS	55.3 <sup>b</sup>	191.5 <sup>b</sup>	8.6 <sup>a</sup>	14.0 <sup>a</sup>	9.7 <sup>a</sup>	15.1 <sup>a</sup>	12.0	19.2	23.5	63.7	11.1 <sup>b</sup>	16.2 <sup>b</sup>
iTero	94.5 <sup>b</sup>	246.8 <sup>b</sup>	11.9 <sup>b</sup>	21.3 <sup>b</sup>	11.2 <sup>b</sup>	18.4 <sup>b</sup>	14.5 <sup>b</sup>	26.8 <sup>b</sup>	31.7 <sup>b</sup>	85.9 <sup>b</sup>	12.7 <sup>b</sup>	25.2 <sup>b</sup>
Omnicam	98.3 <sup>b</sup>	261.8 <sup>b</sup>	22.9 <sup>b</sup>	43.4 <sup>b</sup>	20.6 <sup>b</sup>	33.2 <sup>b</sup>	18.4 <sup>b</sup>	31.8 <sup>b</sup>	36.4 <sup>b</sup>	93.0 <sup>b</sup>	13.0 <sup>b</sup>	23.7 <sup>b</sup>
True Definition	32.1 <sup>a</sup>	98.8 <sup>a</sup>	11.9 <sup>b</sup>	18.4 <sup>b</sup>	12.7 <sup>b</sup>	18.6 <sup>b</sup>	12.1	19.1 <sup>a</sup>	23.2 <sup>a</sup>	61.1 <sup>a</sup>	9.4 <sup>a</sup>	13.7 <sup>a</sup>

CDA, complete dental arch; CI, veneer preparation on right maxillary central incisor; FDP, fixed dental prosthesis; FM, right maxillary first molar complete crown abutment; FP, first premolar complete crown abutment; SM, right maxillary second molar onlay preparation. <sup>a</sup>Scanner with best accuracy within each preparation. <sup>b</sup>Scanner with statistically significant differences within each preparation according to Tamhane T2 test ( $\alpha=.05$ ).



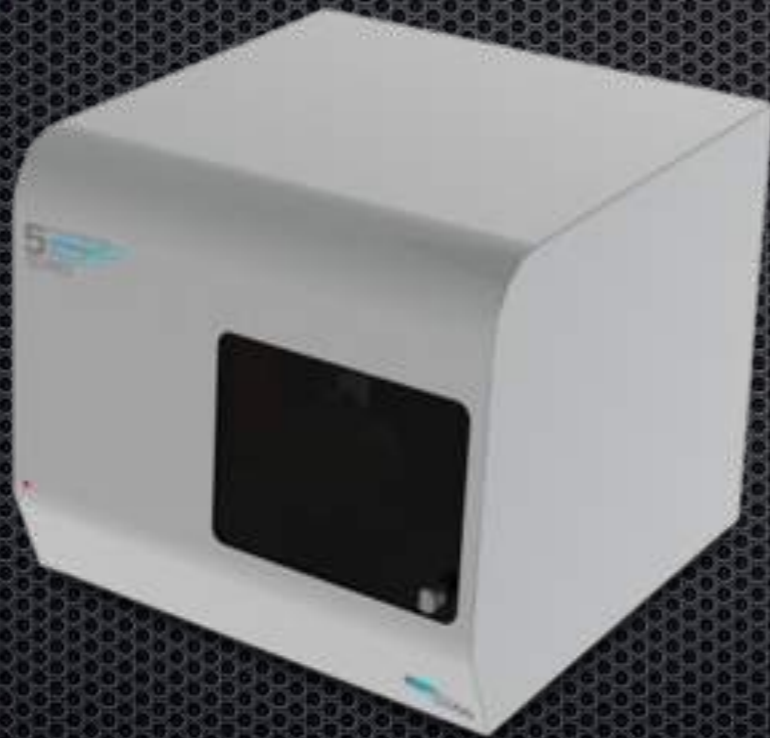
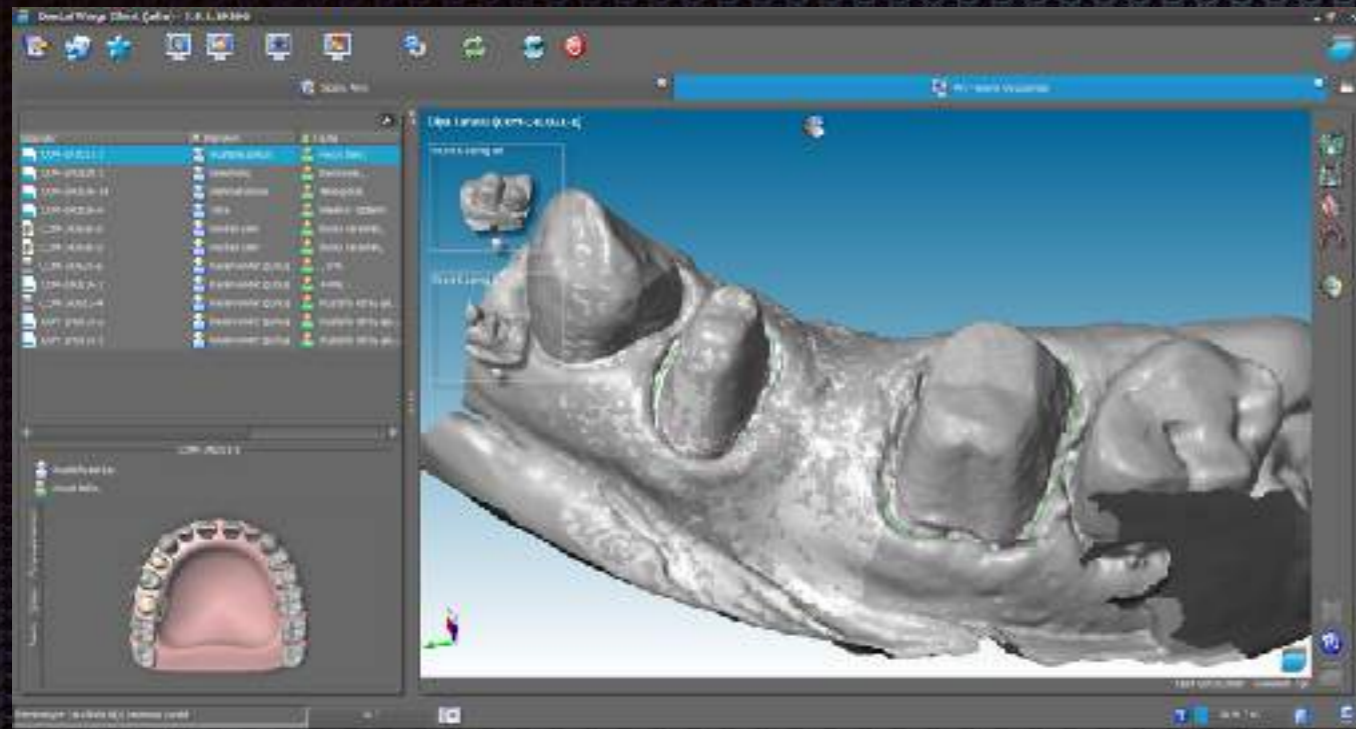
Bu in vitro alıřmanın sınırları dahilinde, ařađıdaki sonulara ulařılmıřtır:

1. Dijital tarama sistemlerinin dođruluđu, aralık taramasına gre farklılık gstermiřtir.

2. Gereklik ve hassasiyet aısından, True Definition tarayıcı, CDA'nın uzun sreli taramaları iin en iyi dođruluđa sahipken TRIOS tarayıcı da ikinci sıradadır.

3. Gereklik ve hassasiyet aısından True Definition ve TRIOS tarayıcı, tek bir diř taraması iin en iyi dođruluđa sahiptir.

4. Tm dođruluk deđerlerinin klinik olarak kabul edilebilir bir aralıkta olduđu grlmřtr.





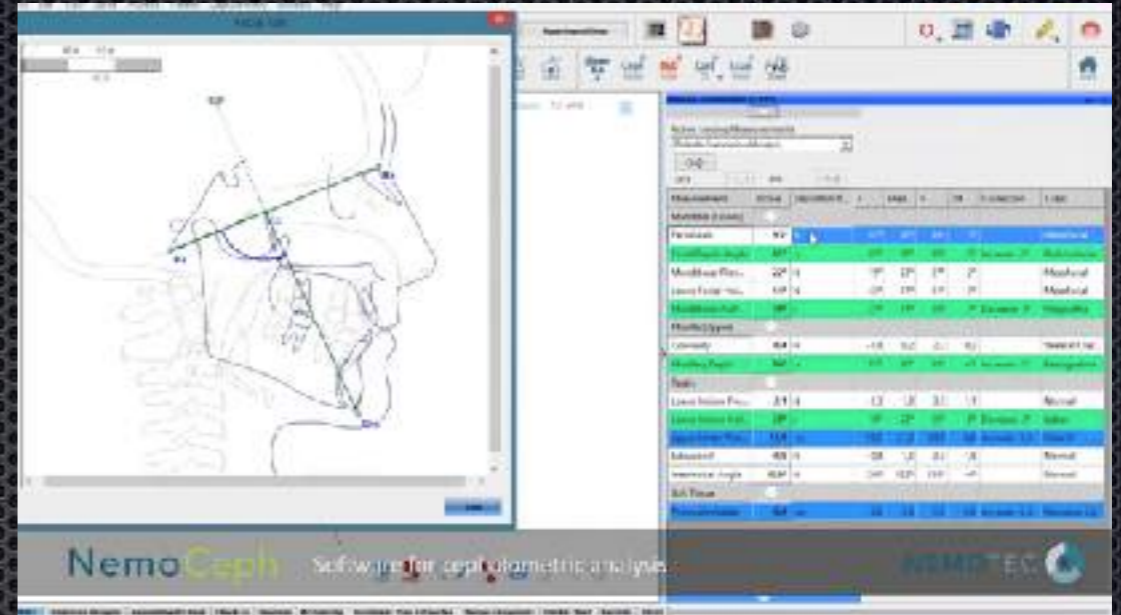
Attach the tracking device  
TIARA



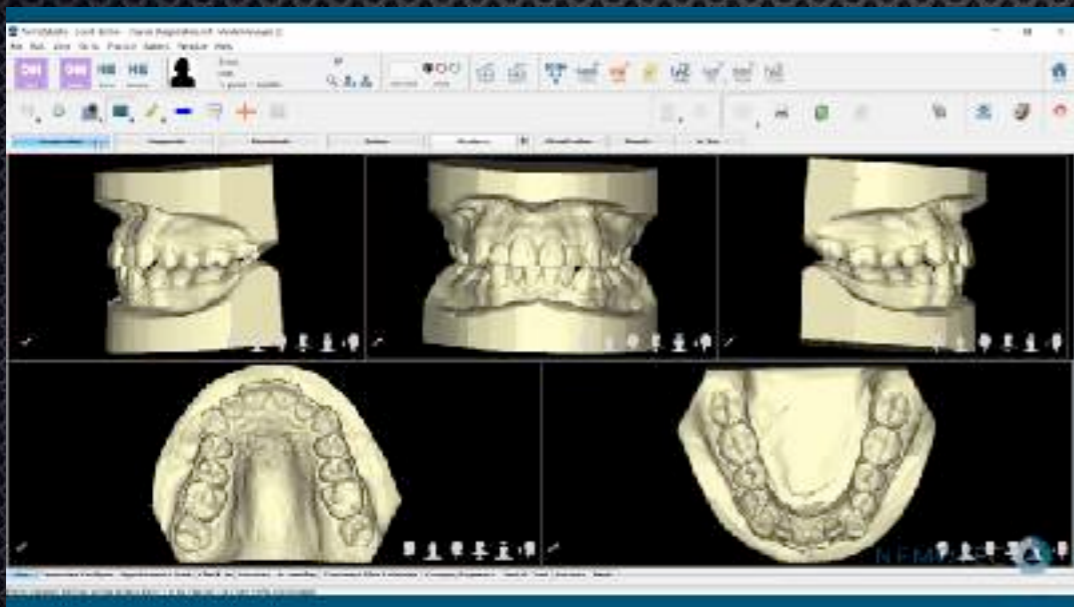
# Dijital Okluzyon



CAD-CAM for Implant



DSD (Digital Smile Design)



Digital orthodontics



CAD-CAM for Restorations

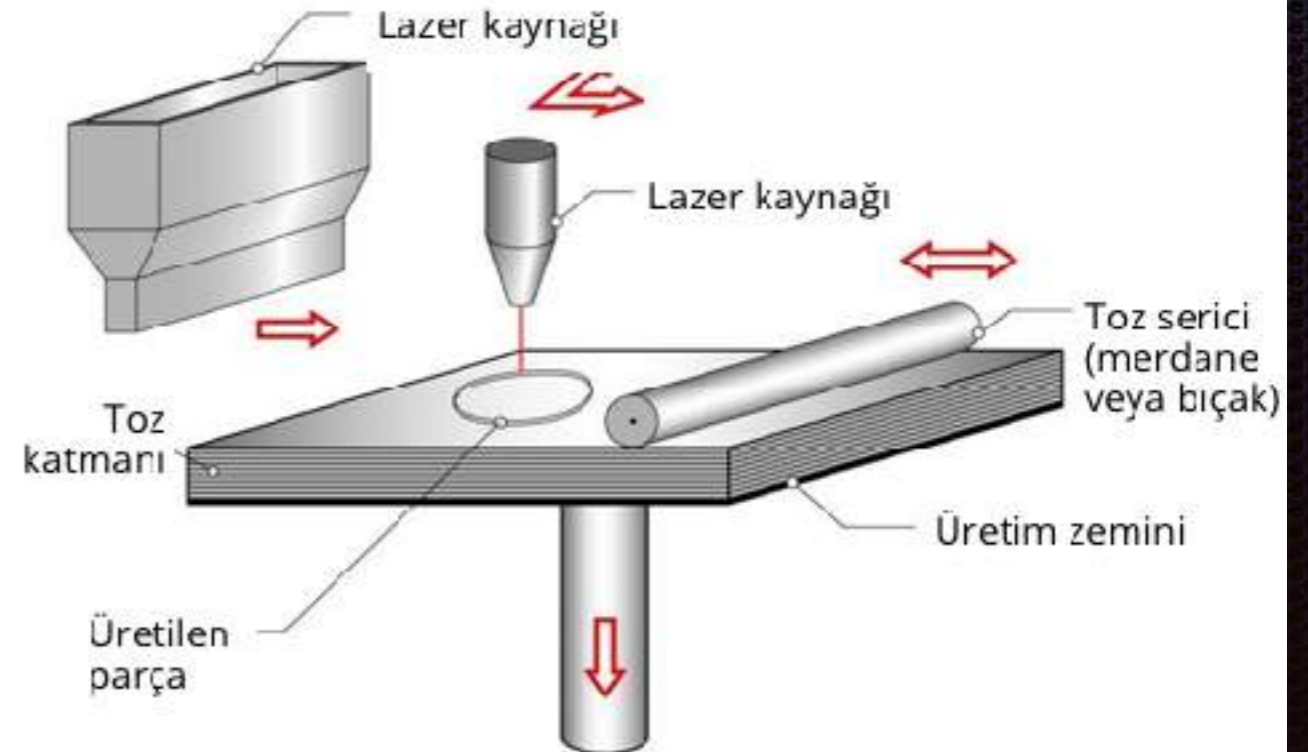
# Ekleme Üretim

- 3D Systems (ABD)
- Concept
- EOS (Alm)
- Milling
- Matsuura
- CAM
- Realizer (A)
- Renishaw
- SLM Solutions (Almanya)

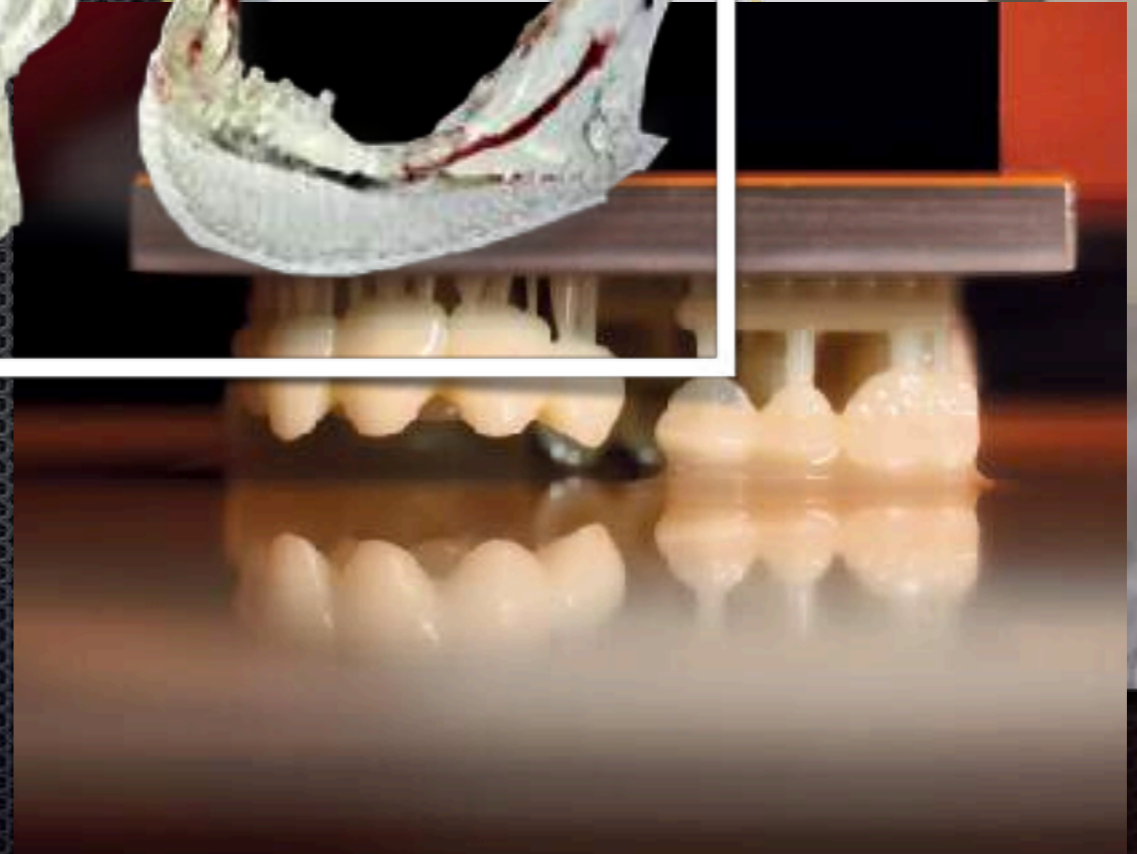
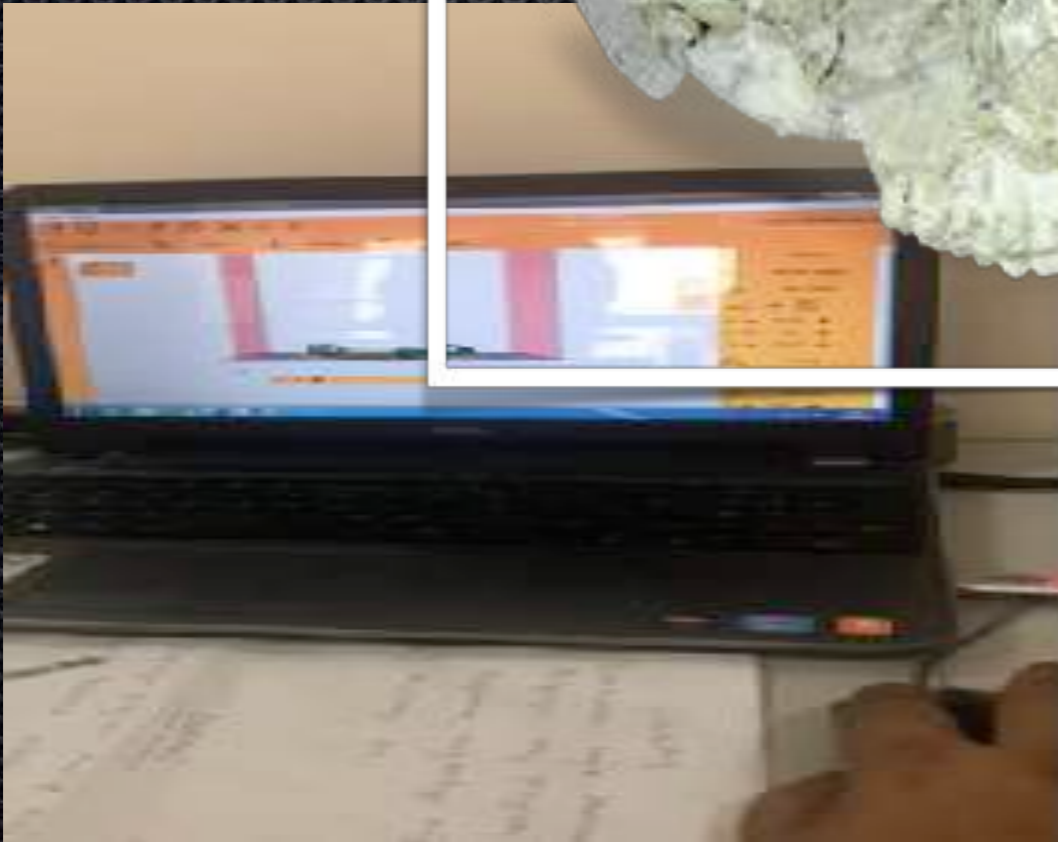


1-Eksiltmeli Üretim,

2- Ekleme Üretim.



Geçici Restorasyonlar,  
Cerrahi Kılavuzlar,  
Mum PMMA modeller,  
Ortodontik Aparenter,  
Pedodontik Yer Tutucular,  
Eđitim Modelleri,  
Geleneksel



# TEŞEKKÜRLER

