

# The Changing Face Of Prosthodontics Plaster To Digital Dentistry -A Review

Dr N.ARAVINDHA BABU<sup>1</sup> Dr. H.AKSHARA<sup>2</sup>

•*Professor, Department of oral pathology Sree Balaji Dental College and Hospital, Bharath Institute of Higher Education and Research, Chennai.*

•*Undergraduate student, Sree Balaji Dental College and Hospital, Bharath Institute of Higher Education and Research, Chennai.*

*Corresponding author*

Dr. N.ARAVINDHA BABU

*Professor , Department of oral pathology Sree Balaji Dental College and Hospital,  
Bharath Institute of Higher Education and Research, Chennai.*

*Email id: dr.aravindmsdcc@gmail.com*

## **Abstract:**

*Previously by conventional impression materials like alginate, agar, elastomeric impression materials, due to its drawbacks like gagging, unpleasant tastes etc. Never methods like digital impressions and digital Scanners had evolved. Digital scanners include a computer display and a hand held wand with a camera to capturing the intraoral images in three dimensions. Digital impressions are more accurate, time saving and increases the comfort of patient compared to conventional impressions.*

**Key words:** *Development of digital impression Crowns and fixed partial dentures, Zirconia,*

## **INTRODUCTION:**

The introduction of computers and its advancements, it has led the dentistry to its next level<sup>1</sup>Digital dentistry in particular, digital impressions have led to significant changes in impression making.

During past decades, conventional impression technique have been used to register the teeth and surrounding soft tissues. But there were certain drawbacks Including volumetric changes in impression materials, expansion of gypsum products etc., which sometimes necessitates remake which consumes energy and expenditure<sup>2-4</sup>To get over these difficulties, Intraoral scanner(IOS) was developed in the field of dentistry.<sup>5</sup>

## **History And Evolution Of Digital Impression Systems**

Fabrication of models from impressions had been there since 18th century<sup>9,10</sup>In 1856 Dr. Charles Stent<sup>9</sup>Figure 1 used an impression material for fabrication of device under his name for correction of oral deformities. Sears<sup>11</sup> introduced agar impression material for crowns. Impregum – 1st polyether elastomeric material was introduced by ESPE in 1965<sup>12</sup>Condensation Silicone was developed but the drawbacks were dimensional inaccuracy. With the advent of Polyvinyl Siloxane it solved many of the

problems like modulus of elasticity, dimensional accuracy, tear strength, poor odor, taste and superior flow<sup>12</sup>



Figure 1) In 1984, Duret invented and patented a CAD/CAM device and illustrated the crown fabrication in 4 hours

### CONVENTIONAL IMPRESSION

Abutment – tray selection – gingival retraction  
 Impression  
 Disinfection – laboratory shipping – cast pouring –  
 Restoration fabrication<sup>5</sup> (Figure 2)

### DIGITAL IMPRESSION

Abutment – gingival retraction – scanning – digital  
 Transfer of impression to lab – digital designing restoration fabrication<sup>5</sup>(Figure 4,5)



Figure 2 Conventional impression techniques

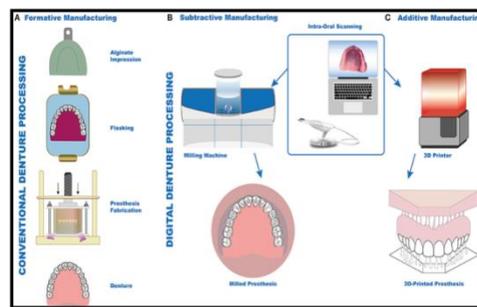


Figure 2) Conventional vs digital technique



Figure 3) CEREC combined a 3-dimensional (3D) digital scanner



Figure 5) a milling unit to create dental restorations

## OS TECHNOLOGIES

IOS technologies IOS is composed of a camera that is handheld, computer and software. The goal is to record three-dimensional geometry of an object with precision

STL (Standard Tessellation Language) is the extensively used digital format. Other formats include PLY files, Polygon individual

Images or videos recorded by the camera under a light projection. Light Capture and Projection<sup>6</sup>

Triangulation a procedure and uses red, white or blue light for real texture and color of tissues for reconstruction by projecting the light from the camera onto an object

Laser Confocal microscopy scanning: It is a microscopic technique for scanning 3-dimensional objects by fluorescent microscopy

Marvin Minsky in 1957 introduced the basic principle in confocal scanning.

Optic triangulation

It is a method of measuring object to the distance without touching them in microns to millimeters

Active and Passive techniques: Active techniques involve. Intraoral tissues are illuminated only by ambient light and reliant to a certain level of the texture of the object in passive technique<sup>7,8</sup>

### Various Commercially Available Scanning Systems:

ITero Lythos Fast scanPlan scan True definition TriosCarrestream CS 3500 8.

### Optical Coherence Tomography:

1. It uses light instead of sound, and it is similar to ultrasound imaging(**Figure 6,7**)

#### Active Wavefront Sampling (Aws):

2. Active wavefront sampling (AWS) is a surface imaging technique

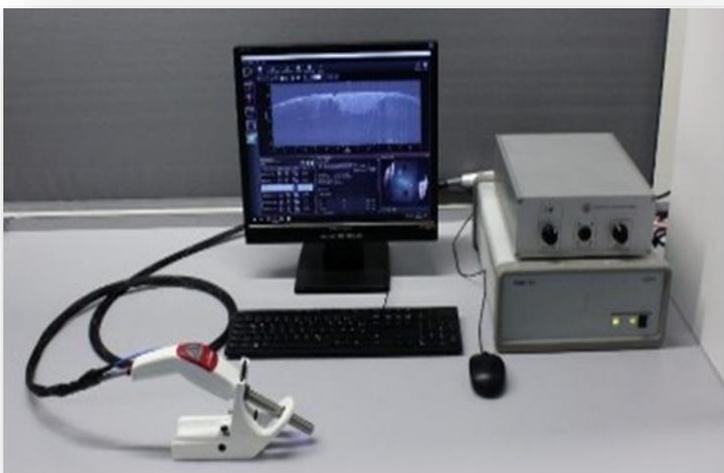


Figure 6) optical coherence tomography

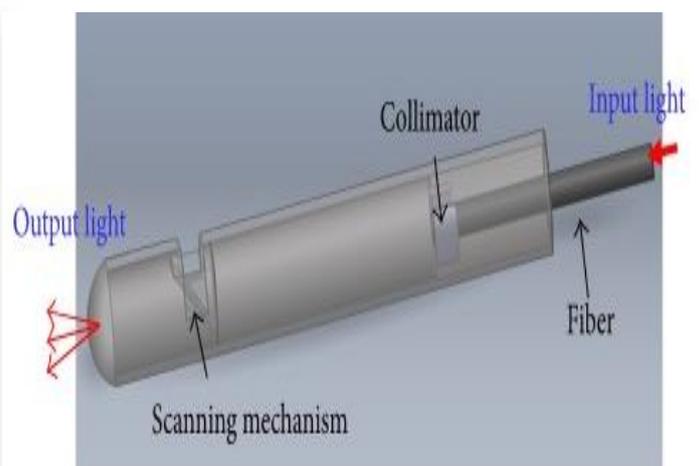


Figure 7) working end of optical coherence tomography

Minimizes discomfort: Digital impressions by IOS minimize the transient discomfort by the placement of impression materials and trays in the patient mouth.<sup>11</sup> It terminates the use of impression trays, materials, etc. As per literature reports patients opt to optical impressions rather than conventional impressions.<sup>12</sup> Time-saving: Through the scanning of the patient's soft and hard tissues chair side time is reduced. Time-consuming procedures like pouring the casts etc. are eliminated.<sup>13</sup>

#### **Disadvantages:**

Sub-gingival margin detection: There was a problem of detection of deeply placed gingival margins and also IOS scanning is a little bit troublesome in case of bleeding as it may conceal the prosthetic margins and makes the scan inaccurate IOS cannot displace the soft tissue margins and cannot register dynamic tissue relationships<sup>14</sup>

Also, additional managing costs like software upgradation, etc were also present. In addition to the above, the laboratory personnel also must be familiar with digital workflow<sup>11</sup>

#### **Cad-Cam A Future Perspective:**

CAD/CAM There are no doubts that treatment technologies and materials in dentistry have progressively advanced over the past 50 years, especially in the field of restorative dentistry and prosthodontics

CAD/CAM technology was useful and effective in compensating for changes in dimensions that come with processing chalky material and post-treatment to obtain fit of crowns and FPDs on abutment teeth

We must not forget that CAD/CAM technology should be used to accumulate data for both fabrication and the functional period as these will be used to formulate evidence-based guidelines for dental devices. Such guidelines are anticipated but still are difficult to develop when using only conventional technology

#### **CONCLUSION**

In this article, we reviewed the current state and future perspectives of the application of dental CAD/CAM systems, particularly in the field of the fabrication of crowns and FPDs restorations, from a perspective based on our 20 years of experience in this field. The application of dental CAD/CAM systems is promising, not only in the field of crowns and FPDs, but also in other fields of dentistry, even if its contribution is limited at present. We feel proud that we have been using dental restorative and prosthetic devices to recover and maintain the oral function and health of patients. There is no doubt that the application of CAD/CAM technology in dentistry provides innovative, state-of-the-art dental service, and contributes to the health and QOL of people in aging societies Therefore, we in the field of dentistry must not procrastinate in implementing new technology for the benefit of our patients

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