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TRENDS IN DIGITAL 3D ORAL SCANNERS IN ORTHODONTICS – *A REVIEW*

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Abstract

Introduction: The emergence of 3D technology and the growing use of intraoral scanners in dental clinic settings have reduced the need for examinations using traditional methods. Dental arches can be directly optically photographed using intraoral scanners, which are medical instruments. When compared to three-dimensional scanners, it projects a laser beam of light onto the target item. **Aims and Objectives:** The goal of the current research is to assess the justification for developing a clear demonstration of numerous clinical features of intraoral scanners in orthodontics. **Methods:** The literature was searched using an electronic database, including Google Scholar, PubMed, Scopus, Web of Science, and Embase, starting in 2017 and searching through 2021. **Conclusions:** There are still limitations despite the innovations scanners have incorporated into orthodontic practice. The most frequent limitations at the moment are being overwhelmed by knowledge, having adequate clinical abilities, and the price of the gadget. More fine research must be shown, so clinicians can understand the technical side of cutting-edge technologies.

Keywords: Intraoral scanner, 3D scanners, conventional techniques, Orthodontics, Dentistry

1. Introduction

One of the most recent technology developments in orthodontics is the use of intraoral scanners, which scan the patient's dentition rather than taking an impression with traditional materials [1]. The requirement for storage, easy access to 3D diagnostic information, and digital file interchange between experts and patients are only a few benefits of numerical dental models. Digital dental models also make it possible to create unique detachable and fixed appliances and enhance treatment planning through virtual setups. In orthodontics, digital scanners have replaced conventional alginate and vinyl polysiloxane impressions. It was a significant development in 3D digital model storage technology that eventually became an office tool. It eliminates the uncomfortable process of taking impressions using trays, allowing doctors to create transparent aligners, indirect-bonding trays, personalized braces, and orthodontic products. [2]. Dr. Francois Duret introduced CAD/CAM in 1973 for use in dental applications[3]. In 1987, Sirona Dental Systems unveiled the CEREC system, a prototype digital impression tool for restorative dentistry. It has been established that this technology is a revolutionary tool for CAD/CAM dental unit manufacture [4]. Nevertheless, it appears that the scanning quality is poor. It was advertised that the first digital impression system, introduced by iTero in

2006, was capable of full-arch intraoral scanning. Align Technology later created the market-leading intraoral scanner Cadent in 2011 and partnered with iTero to transmit data for Invisalign therapy.[5]. Making Intraoral scanners is a focus for almost all of the main dental equipment manufacturers. In 2012, the 3M ESPE True Definition scanner was released. It allowed for digital scans to be utilized to create Incognito bespoke lingual braces.[6]. Ormco announced Lytho's impression technique for its Insignia and Clear-guide systems [7]. In 2014, subsequently considerable demand for advanced reciprocity between manufacturers, the 3M™ True Definition was eligible for Invisalign cases, True Definition scans are used for Invisalign treatment planning, and iTero scans for the Incognito system [8]. 3D virtual models are possible with digital intraoral scanners. The non-connect optical theory has been turned into intraoral plotting or mapping. The digital model offers springy selections, planning, and implants, as well as education models and orthodontic fixed and removable appliances like custom-made ceramic brackets, maxillary expanders, clear aligners, and Essix clear retainers [9]. These negative impression characteristics may occur. The patient's computerized digital record file includes the extremely precise exposed file settings, which can be stored on a drive, retrieved from, and completed through a secure, cloud-based hub from any location online. Furthermore, the online cloud-based intraoral scanners function in a way where the raw images are scanned, sent to the online digital cloud storage, and further handled for research needs. Though, several negatives presently restrict the application of intraoral scanners. The intraoral scanner's higher prices, related software's annual subscriptions, and the network connection [10]. The patient's computerized digital record file includes the extremely precise exposed file settings, which can be stored on a drive, retrieved from, and completed through a secure, cloud-based hub from any location online. Furthermore, the online cloud-based intraoral scanners function in a way where the raw images are scanned, sent to the online digital cloud storage, and further handled for research needs. However, several drawbacks now limit the use of intraoral scanners. The greater cost of the intraoral scanner, the yearly fees for related software, and the network connection [10].The information needed to implement intraoral scanners in a dental office. Intraoral scanners may be easy for clinicians to use if they are interested. Additionally, the accuracy and turnaround time of the currently available intraoral scanners may vary; as a result, the current device has numerous recommendations for clinical practice. [11] Before purchasing intraoral scanners and other important characteristics, it is important to consider this. The goal of the current research is to look into the evidence that indicates certain clinical traits and features of intraoral scanners are now used in orthodontic practice.

2. Materials and Methods

The papers included the studies assessing the limitations of intraoral scanners, state information, such as observation of time, ease, and inclinations approximately on digital intraoral scanners, the online literature search databases such as PubMed, Google Scholar, Scopus, Web of Science, Embase examine of all journals till the year 2021. No limitations and restrictions on language were beneficial. Throughout the online search compromise, all articles were significant. In the course of the search, PubMed produced 208 articles that were broken down based on the title, abstract, and relevancy to the main subject of interest. Based on this standard, 104 articles were excluded. Complete-text articles After analyzing 52 articles, 26 were eliminated based on the exclusion criteria.

3. Technology integrated with Intraoral scanner

The intraoral scanner is made up of three basic parts: a portable camera, a computer, and software that uses scanners. A three-dimensional object's geometry should be precisely captured by an intraoral scanner. The digital format STL file is widely used

. A 3D Cartesian synchronization system is used to describe an unstructured triangulated surface in an STL (Standard Triangle Language) file by the element and zeniths by the right-hand rule of the triangles. The current configuration, which may be used in a variety of industrial fields, consists of a system of triangular faces, each of which is represented by three 3S points (Figure 1) [12]. The Polygon File Form was created to record the hue, consistency, transparency, and dental tissues.

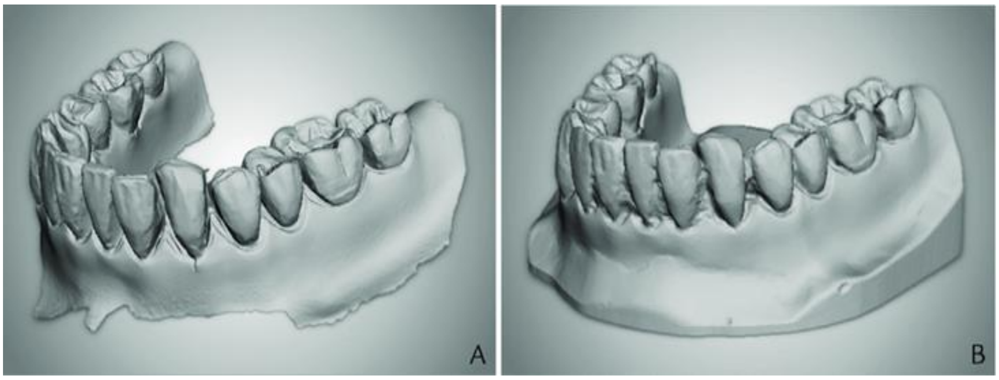


Figure 1: Samples standard Tessellation Language file STL). A] Direct digital scan. B] Indirect digital scan[11].

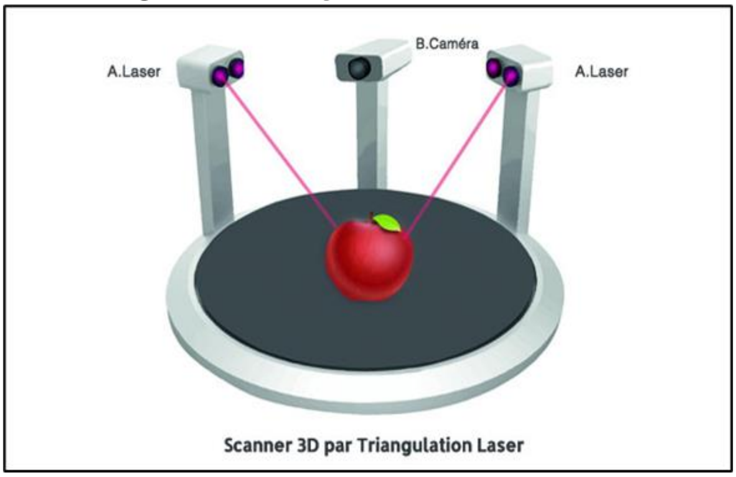
3.1 Projection of Light and Capture.

In the framework of 3D reconstruction, passive and active techniques are distinguished. Passive approaches, which depend on an object's texture to some extent, illuminate intraoral tissues only with ambient light. Active approaches, which rely less on the actual texture and color of tissues for reconstruction, use white, red, or blue structured lights projected from the camera onto the object. In active approaches, an object is projected with a light point, and the distance to the object is determined using triangulation. Projecting a light pattern, such as a line or mesh is a different option. The surface reconstruction can be done using wave analysis, a video with several images captured every second, or a compilation of photos.[13].

3.2 Non-contact distance measurement of the object technologies

3.3 Optical Triangulation

Figure 2: Triangulation method [13]



The object is placed at the midpoint of a triangle formed by important points at significant angles. Two detectors shape the interpretation of two points, and a single detector is used with a prism to capture two different points in a short period (Fig 2). The CEREC system has made considerable use of this procedure. There are three points: the surface of the object, the emitting laser, and a sensor. The Pythagorean theorem can be used to calculate an object's surface data, which can be constructed using angulation and distance. The object is placed at the midpoint of a triangle formed by important points at significant angles. Two detectors shape the interpretation of two points, and a single detector is used with a prism to capture two different points in a short period (Fig 2). The CEREC system has made considerable use of this procedure. There are three points: the surface of the object, the emitting laser, and a sensor. The Pythagorean theorem can be used to calculate an object's surface data, which can be constructed using angulation and distance. A thin layer of radiopaque powder is applied to the tooth surface, unifying the surface texture (Optispray® by CEREC, which mostly contains titanium oxide), to achieve more detail and prevent impulsive light dispersion.[14].

3.4 Confocal laser scanning

Confocal laser imaging is a method centered on gaining focused and defocused images after particular depths of despair. It identifies the range of perceptiveness of the image and concludes the distance to the body is an interconnected lens’s focal length. An object can be remodeled by consecutive images using aperture standards and dissimilar angles all over the object's place (Figure 3)[15]. The area of sharpness is associated with the dexterousness of the scanner which can produce motion-blur, and the technical method involves larger optics in clinical practice(Fig 4).

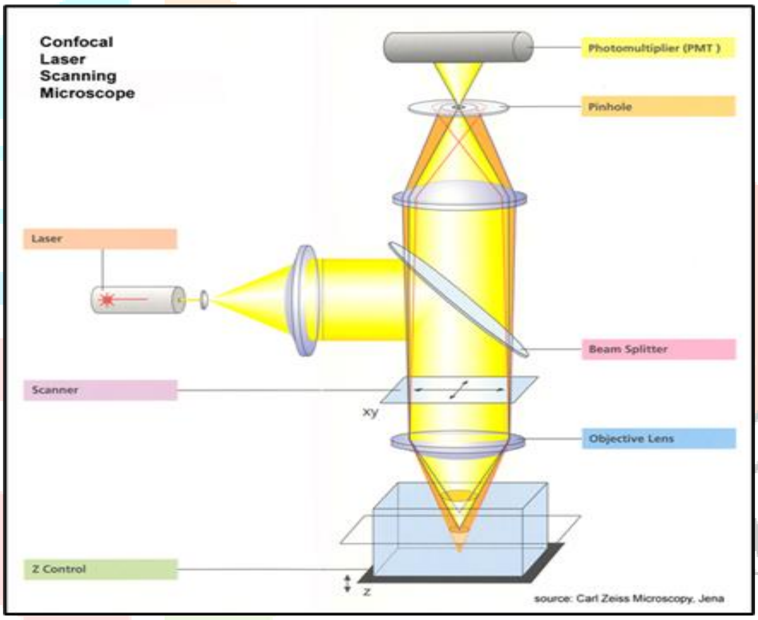


Figure 3: The confocal laser scanning microscope method [14]

The projection of emitting laser is to be achieved by a mesh with a small pinhole to the target. The Reflected light from the focus of the object. The confocal imaging plane is identified. The Out-of-focus images are not documented and the complete 3D structures are reassembled by regaining 2D images at different planes. This development is recognized “point and stitch of reconstruction.” The two Manufacturers like iTero and TRIOS 3 shape are scanners that use this technique[16].

3.5 Active Wavefront Sampling

Active Wavefront Sampling or 3D Motion video recording in a shallow imaging method that involves a camera with a sensor and an off-axis component. This component travels on a circular path all over the places on the optical axis and facilitates the point of importance. Distance and depth data are resulted and planned.

The outlined point uses a high-definition visual camera with a trinocular image with 3 small video camera sensors at the lens to capture three accurate sights (Fig. 5).

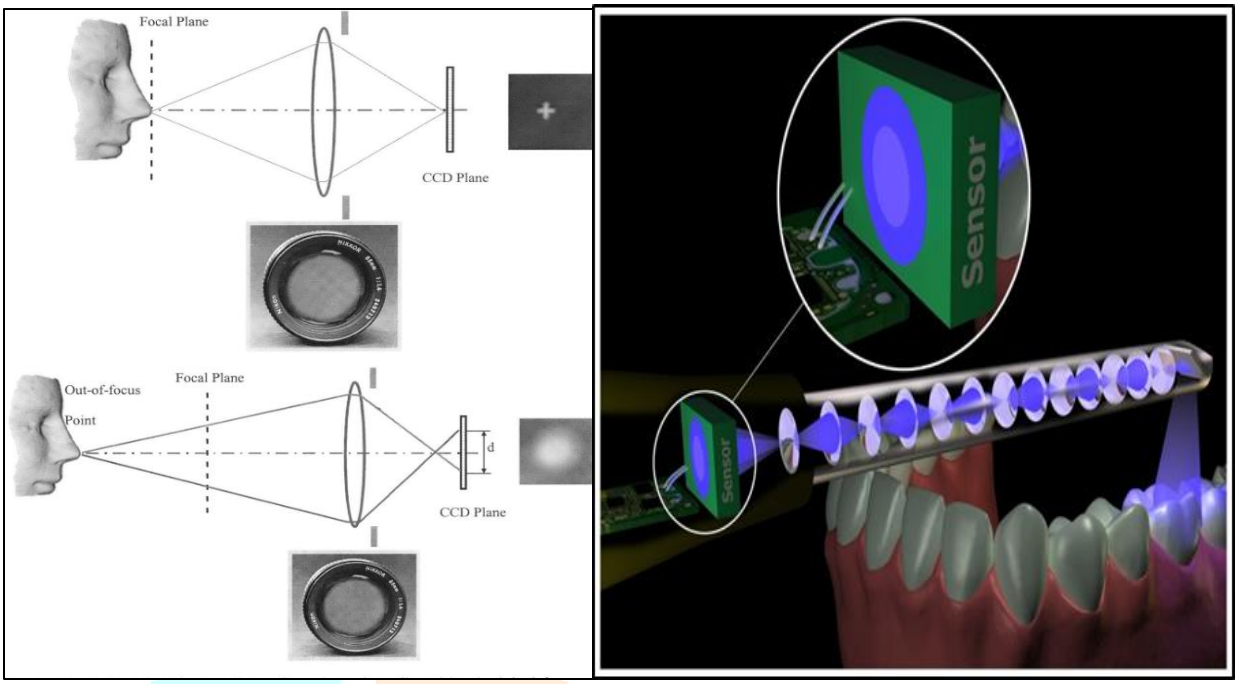


Figure 4: a] Diagram of the depth-from-defocus method, the target of interest is positioned on the lens in-focus plane. The image is out of focus, and the non-zero distance of its blur spot is directly associated with how far the target is from the in-focus plane **b].** 3D Motion video recording focusing process[17]

In the CMOS sensor which is placed behind the camera, light energy transforms into the electrical distances amid two data-position accurateness can deliver, and data severance is one of the distinctive features. The active wave-front sample. It progresses into taking it to the next level technique, with 3d-in-motion video technology, revolution image processed algorithms, and actual time classical reconstruction are three aspects. An attenuated layer of powder dusting before scanning is suggested aids connection to the position of the location. It diminishes system costs by eradicating the necessity for objective laser illumination and several cameras to obtain 3D images[18]. It permits the procedure to be pragmatic in a comprehensive variety is available 2D systems such as cameras, microscopes, and endoscopes.

3.6 Stereophotogrammetry

Figure 5: Extraoral stereophotogrammetry camera[18]

Stereophotogrammetry estimations of all directions (x, y, and z) are over with the algorithmic analysis of images. (Fig 5). This approach is dependent on the projection of passive light with software and more moderately dynamic projection with hardware, the camera is moderately minor, control is easy, and its economical assembly[19].

3.7 Accordion Fringe Interferometry (AFI)

The 3D figures can now be taken rapidly, precisely utilizing innovative technologies called accordion fringe interferometry. These scanners are characteristically high-dynamic ranges significance, they can scan reasonably dark or shiny surfaces simultaneously. The technology authorizations rapidly and precisely scan. The density and method of balance of the AFI optical block.

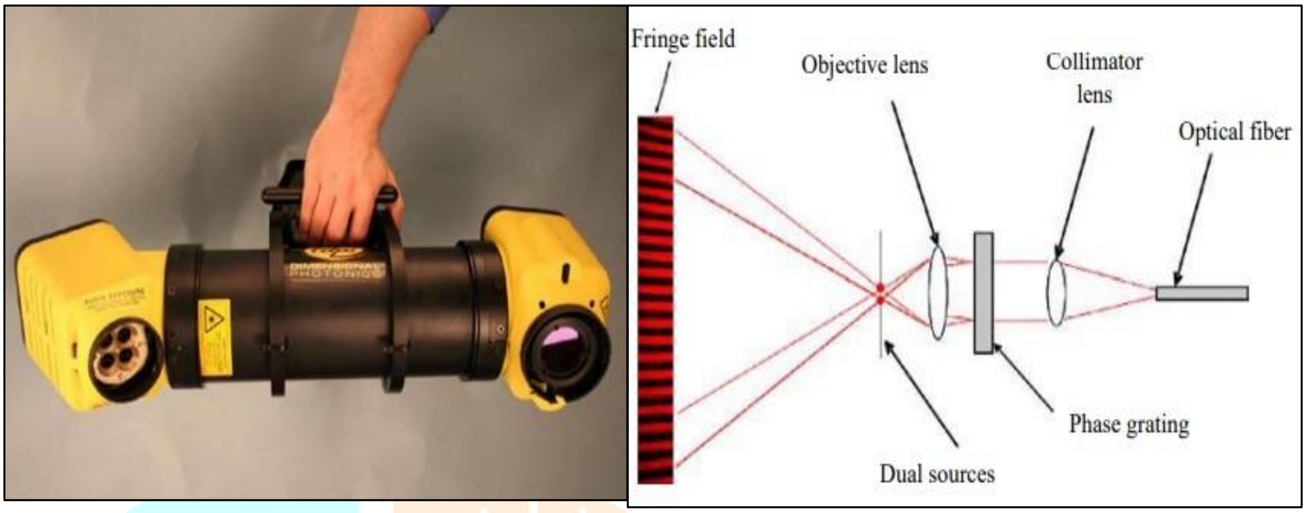


Figure 6: a. Outlook of AFN 5000 with a source of laser light in the head on the left side and the digital camera in the head on the right side. b. Characteristic illustration of the beam system in the scanning, headlight energy reaches after the laser diode on the right and is estimated on the left side [20].

AFI-based scanners are predominantly suitable for computerized presentations on the level. Distinctive pre-scanning shallow groundings coatings are stereotypically non-essential for most fragments. This is a significant benefit for AFI scanners meanwhile exterior research and cleaning methods can be costly and time overwhelming and other issues with coating; adding dimension errors, and inconstant thickness of the segment scanned can be toxins. Characteristically, no distinctive lighting is essential with AFI-based scanners. It uses high-definition cameras. The sensor promptly captures actual images, divergent to the point-and-stitch reformation of data, and scanners take an advanced range of radiance, permitting them to scan deep surfaces [20].

3.8 Optical Coherence Tomography (OCT)

This method accomplishes high-resolve cross-sectional imaging of the morphology of biological resources and tissues. OCT is comparable to ultrasound imaging, excluding the usage of light as an alternative to sound. The dimensions of distance and microstructure are attained with a back-reflected light wave simultaneously. Though these imaging depths are shallow as ultrasound, a resolution of 1 to 20μm is accomplished[21].

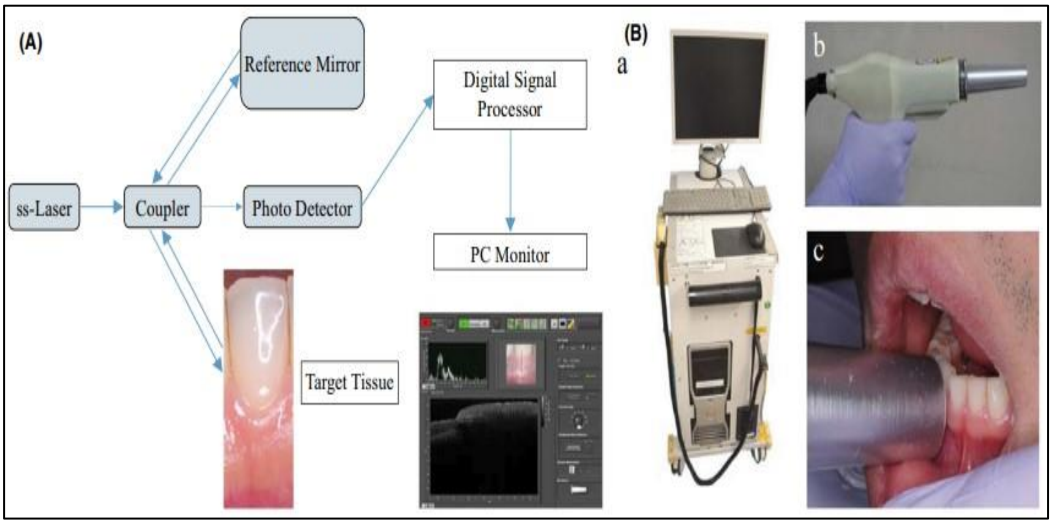


Figure 7: a. Outline of these partial systems. One part of the scanning laser is separated by a connection, is redirected by the orientation mirror, and the other part is reflected by a hand probe. Two mirrored lights are united to the photodetector. The process of light is using digital signal processing. As a final point, the appearance is shown on the monitor. (b) (1) Outline of dental SS-OCT system. (2) Scanning probe. (3) All through OCT imaging, the scanning tip simplifies by keeping a continuous distance from the surface and exclusive of the lip and buccal mucosa. [21].

3.9 Technologies in Reconstruction

The challenging task of producing a 3D geometric model is the corresponding points of interest from dissimilar angles. The distance among dissimilar pictures may well be envisioned by an accelerometer incorporated into the camera and compared to the calculation. It is implicated to define the fact of the image. By use of algorithm calculation outlines are compared. Points of interest are equivalent to changed images. It originated from the recognition of conversion areas, which are strong curves, physical perimeters, or alterations in grey intensity called Shape from Silhouette [22].

4. Benefits of intraoral scanners

a. The ability to scan the dentition, produces digital models. It is essential for conservative impression-making methods might cause patient anxiety about the material or the impression trays [23].

b. Kids and adult patients with gag reflexes can't receive the conventional impression method because of the sizes of the try, so the intraoral scanning method is greatly valued. A study reported that patients have a preference for the intraoral scanning process over conventional impression techniques [24].

c. According to literature, Intraoral scanners have been demonstrated and evaluated their working time is saved in contrast with conventional impression techniques. Though intraoral scanners don't give the impression of significantly saving time full arch scanning takes less than 2 minutes when related to the conventional method which takes between 4 to 6 minutes. The time is saved subsequently for the subsequent steps of the cast of pouring, and removal. The communiqué between the clinician and the lab, sending by e-mail the digital model file by rather than the delivery carrier system. Therefore, the intraoral scanner can save money and time [25].

d. Communication between orthodontists and dental technicians can be easy, reinforced, and of better quality by being an accessible immediate valuation of the digital impression superiority [26].

e. An intraoral Scanner can aid as an active patient communication and education device, amplifying the association with positively affecting inclusive treatment. Moreover, the intraoral scanner is reflected as a great advertising tool. The patients are more involved in the latest technologies and digitally furnished dental offices [27].

f. Intraoral scanning is done with digital models which save as a Standard Triangle Language file, for 3D printing of models comprising each scan data retrieval, active storage, stability with conserving model file reliability, and diagnostic adaptability [28].

5. Drawbacks of Intraoral scanning and digital models

a. The primary drawback of scanning needed the requirement of titanium dioxide to powder for the arch earlier scan to certify that the light produced from the scanner was reproduced to the scanner pointer in a constant method. The powder used was felt unpleasant by most of the patients, they felt resemblances of impression material in their mouths[29].

b. Intra-oral scanning is not comprehensively received by patients and presents substantial savings in time and expenditures. The study models are essential in conflict with virtual models because the charge made by the laboratory is similar to demonstration-quality models.

c. The scans are essential for a given time in practice, there are substantial delays in chair time, and waiting for the time for a scanner becomes accessible and experience procedures. It is easy to keep sufficient impression trays and supplies than, to have several scanners.

d. Intraoral scanning is designed for diagnostic purposes and progressive 3d models specifically for patients undertaking orthognathic surgery. The models were attached for centric relation on fully adjustable articulators using bite and transfer of face bow[30].

e. In the study models, the capability to construct splints for diagnosis and treatment using the 3D-printing machine. STL files are transferred to the laboratory for fabrication. Transitional splints for orthognathic surgery are frequently assembled at a site. With the newly changed system of the plan, the restrictions on 3D images should be in place order.

f. In-office, fabrication, and designing of the models are completed, but the time shift for appliances must be deliberate in scheduling. 3D-printed appliances cannot be produced rapidly when providing work for a laboratory in such cases and planning for appliance delivery becomes challenging.

6. Applications of Intraoral Scanners in Orthodontics

a. Patients' Impression-making experience is intimidating, affecting their uneasiness and nervousness, specifically with a gag reflex.

b. Impression materials like alginate and Vinyl Polysiloxane Impression Materials have been correlated with several disadvantages, such as holes, foams, inadequate size of impression tray, sensitivity to temperature, restricted working period, inappropriate trimming, and breakages of the dental model[31].

c. The reduced dental chair time, accelerated the suggestion of the files to the dental labs, extended ease of access from various locations, reduces storage complications, and breakages of models, better the quality of the appliances, improved the system, facilitates the fabrication of aligners, retainers, and orthodontic appliances.

d. For patients, it has an improved demo of their treatment planning and the predicted final treatment results, also decreasing chair time, apprehension, and distress. The reliant software-based device, and clinician. Usage includes treatment planning, indirect bonding tray, customized lingual bracket, clear aligner fabrication, orthognathic surgery simulation, and surgical outcomes and fabricated with patients' study models with a 3D printer used for treatment planning[32].

e. The precision of intra-oral scanners has been examined in various studies. Though the initial version was not inadequate for workflow, the time and accuracy were better quality by refining optical technology compared to conventional methods, and deviance in the complete-arch trial which resulted in a higher range of 40.9–85.7 µm; an average of 60 µm was attained with digital scanners than with conventional alginate impressions (174.3 µm).

7. Commercially available Intraoral Scanners

7.1 TRIOS 4 (3 Shape)

TRIOS 4 by 3Shape is one of the furthermost profligate-selling intraoral scanners in the world market, even though it has a similar speediness as the TRIOS 3, it has significant enhancements in hardware and software and its functions. It has a contemporary and trendy design A full arch scanning is achieved in 25 seconds. For the detection of caries, an additional scan is essential to overlap the digital model. The process is through the fluorescence technologies integrated color[33].

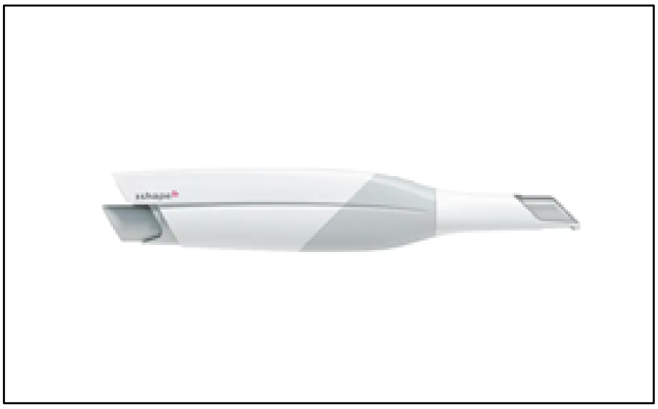


Figure 8: Trios 4 by 3Shape, Denmark[33]

A color map displays ranges of fluorescence that reflect active caries sites. Moreover, the scanning tip for the exposure of interproximal caries determination is utilizing transillumination. It has quick scanning tips, so there is no need for intervals to warm up to start functioning. It's the first scanner with a completely wireless choice (Fig 10).

7.2 Lythos scanner (ORMCO)

It is a small, handy, and wireless device objective lessens the essential for taking PVS and alginate impressions. Relatively outdated point-and-click technology that is restricted and captures a single image, Lythos AFI Technology incarcerations of data instantaneous against post-process edging by gaining detailed high-definition at all of the teeth surfaces. The high-resolution, dual-arch scan can be accomplished same time as a PVS impression. It has a simple, handy design, it weighs less than 25 pounds to transfer from one chair to another [34].

Figure 9: Lythosnscanner (ORMCO), USA[34]

It is an open platform that generates patient data stereolithography (STL) files. DigiCast models are an easily manageable online gateway for digital study models, eradicating the essentials for storing the data. It has improved patient comfort with a smaller wand tip and it can capture data in a wet, resulting in less patient uneasiness and chair time (Fig 10).

7.3 3M™ ESPE True definition

Figure 10: 3MTM ESPE True definition oral scanner, USA[35]

The 3M True Definition scanner can scan single-unit, multiple units restorations, and bridges. It can also be used to scan full arch and has been clinically proven to have an adequate rate of 99.7%. It offers an open platform and can be attached to specialized design software and with a chairside milling machine. When the digital wand moves on the teeth surface, This System uses an LED light and video imaging system to capture the data (Fig 11). The video then developed into the digital dental model. It has an inventive design that makes for a faster, easier, and more comfortable single-handed scanner. The digital workflow helps and ends up the need for storage space in your practice. It provides full flexibility and allows patient data to be processed by the laboratory. The Scan results are very clear-cut with extraordinary detail [36].

7.4 I Tero – Element, I Tero – 2, and I Tero - 5D Element - Align Technology

These type of intraoral scanners are futuristic it provides reliability, speed, spontaneous procedures, and exceptional imagining experiences for clinicians. It precisely provides the best workflow with the Invisalign aligner system (Fig 12).

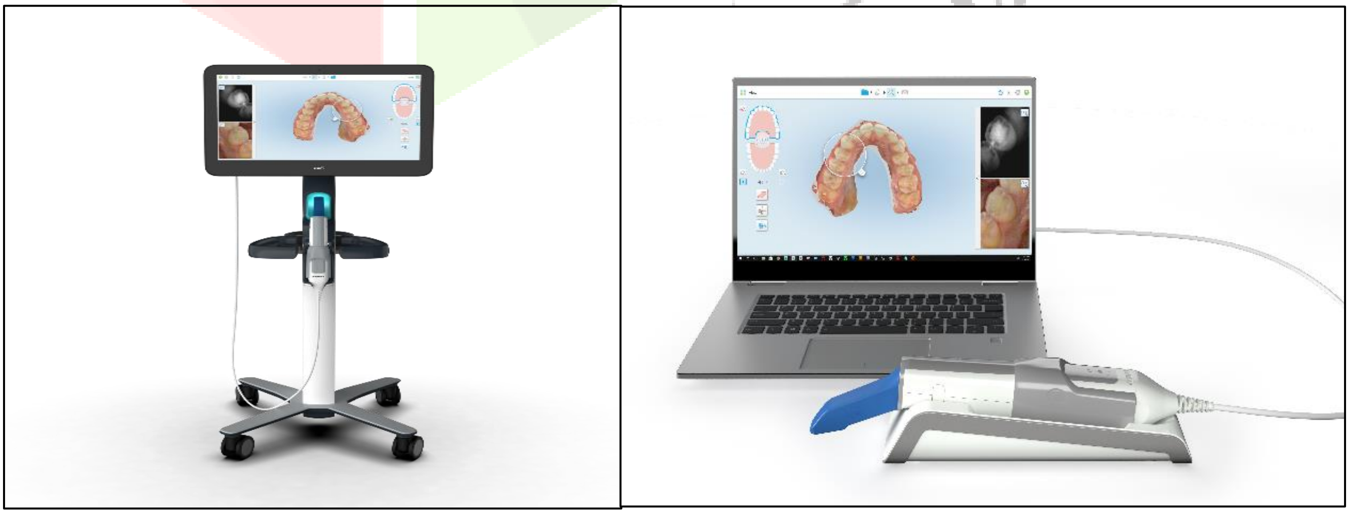


Figure 11: iTero – Element, iTero – 2 and iTero - 5D Element (Align Technology), USA[34]

iTero scanners are powered completely for the Invisalign Outcome Emulator chairside presentation to benefit patients' envisaging of their teeth at the end of treatment. The virtual result can be collected with the patient by attachment file through email. The patient is motivated with better acceptance of the treatment. Furthermore, the Invisalign Progress Assessment software appreciates the Invisalign treatment tracking plan. It increases patient compliance and satisfaction. It is in a class by itself with intraoral scanners that are integrated with near-infrared imaging technologies and can scan the internal structure (enamel and dentin) of the tooth It is integrated with a dental imaging system that records in 3D, color, and NIRI with a single scan. The assessment enables over time using iTero Time-lapse. This technology supports identifying interproximal caries and lesions above the gingiva without exposing hazardous radiation [36].

7.5 Planmeca Emerald (E4D Technologies)

Planmeca Emerald is small and portable with a lightweight intraoral scanner it has been designed with premium features. With exceptional speed and accuracy, it signifies the highest level of scanning available in the world today. It has been designed to fit the user's hand and places minimal stress on the wrist due to its lightweight. The intraoral scanner's small size is also very comfortable for patients The Planmeca Emerald is assembled on an open platform.

Figure 12: Planmeca Emerald™ (E4D Technologies) Helenski FINLAND [36]

The system platform makes smooth integration with "Plug N' Play" competence with USB-3 assembly allowing the dentist efficiently use without apprehensions over Wi-Fi connections (Fig 13). The compactness permits sharing between operatory and multiple PCs. It comprises Planmeca-Romexis an online server-based solution. A replaceable cord reduces, extending the scanner's lifetime [36].

7.6 CEREC Omnicam (Sirona Dentsply)

CEREC Ominocam has ultimate handling, and powder-free scanning, and accurately scans the full jaw using 3D technology with accurate color. It is designed to be smooth design and lightweight, and naturally fits in your hand, making the scan easy, and impulsive, with good ergonomics. Additionally, it allows you to determine the color of

Figure 13: CEREC Omnicam (Sirona Dentsply), USA[37]

the scanned teeth in the CEREC software also allow you to expand your treatment range to aligner treatment (fig.14). It is excellent and multi-centered, offering a comfortable safe Chairside. It documents taking a coating-free scan of the tooth and gingiva[37].

7.7 Carestream CS 3800

The new CS 3800 intraoral scanner has a high-performance wireless intraoral scanner for optimal flexibility and seamless user experience. It features a slim, cordless design with solid and handy intraoral scanners on the market. It has faster and smoother scanning with a larger and broader field of view and a deeper field of view with complete control of the intraoral potentials and has the right handle intended with association with Studio F. A. Porsche, the scanner (fig 15). It has the field of view distended to 16 mm x 14 mm to license to seize subgingival margins and interproximal areas scanning of soft tissue. It structures a 20 mm depth of field.

Figure 14: Carestream CS 3800 model, USA [38]

The scanner can be stimulated from one operator to another and it is united through a CS Voyager trolley and AIO-induced medical-grade PC. It is the leading scanner in the range of intraoral scanners. The scanners are integrated with the Scan Flow 1.0.4 software, which comprises signs for implants, restorations, aligners, and sleep apnea devices. The digital impression is captured and can be transferred from CS Scan Flow, CS Model+ v5 for orthodontic treatment planning and designing clear aligner mode [37].

7.8 Aoralscan 3 (Shining 3D)

The Aoralscan 3 intraoral scanner is a high-performance oriented scanner. The scanning is very fast and provides a smooth experience. It is equipped with intelligent algorithms to make the scanning process pleasant. Soft tissue is detached automatically and precisely and has a fast bite registration scan. The scanner quickly scan is paused and resumed. Moreover, it has the best scanning AI (Fig 16).

Figure 15: Aoralscan 3 by Shining 3D, China[38]

There is no lag in screens between each stage of the scan during the scanning procedures, making the workflow fast and effective. The transitory processing occurs when swapping between jaw scans, but this is hardly visible. The majority of the processing occurs once all scans are completed. The final post-processing will take about 3-5 minutes in most cases on the high-configuration system. The software presents several onscreen instructions during the workflow to aid you to scan and perform the workflow appropriately [38].

7.9 Medit i700 (Medit Corp)

The Medit i700 is an exceptional intraoral wireless scanner. Medit software configuration aids to scan even faster. It easily accomplishes scans full-arch in less than 40 seconds; it can scan fast the full-arch on a patient within 18 seconds. The Medit i700 is similarly faster and has better hardware capabilities than its preceding generation Medit i500 (Fig 17).

Figure 16: Medit i700 Intraoral wireless scanner (Medit Corp), South Korea[39]

The i700 scanning procedure used is comparable across all scanners on the market, therefore using it is simple and produces high-definition color scans. It has a superior scanning field of view of 14 x 13 mm. It is connected to a laptop or computer through plug-and-play with USB. It has an exceptional feature in that it doesn't require a power hub. It only works if the PC has a USB-C port and sufficient power to charge the scanner. The scanner makes it very suitable to utilize and transfer amid a PC and there is no need for power cords any longer [39].

7.10 Virtuo Vivo Intraoral Scanner (Straumann Group Digital Solutions)

Virtuo Vivo's intraoral scanner is designed ergonomically, providing a superior grip. The detachable sleeves protect sensors to eradicate patient changes in direction time. During sterilization, sleeves can resist up to 250 cycles. Motion control is a cutting-edge, new, and exciting technology that allows touch-free handling while wearing gloves. It has an air mouse wireless technology that permits the scan's movement based on the scanner's direction (Fig 18).

Figure 17: Virtuo Vivo Intraoral Scanner (Straumann Group Digital Solutions), USA[40]

CARES Connect is extraordinary software that licenses clinicians to send scans to the laboratory, and the tracking feature tool in the software will deliver the status of the case. Multiscan Imaging captures scan files from many directions instantly. It is power-packed with two diminished 3D scanners with a small hand-held intraoral scanner. Virtuo Vivo's intraoral scanner delivers color scanning, allowing for improved communication between the clinic and the patient. With a luminous halo on the scanner, audible signals allow the user to authorize later data to be acquired. The Quality of data is authenticated in real-time and produces a 3D model by the application of the software. The collected data can then be directed to a service provider [40].

8. Conclusion

After a Subsequent objective summary of the literature, Intraoral scanners seem clinically reformed for common practice and use of technology. Respective technology has to be deliberated in the framework of specific activities, necessities, and prospects of clinicians. Appreciating the Intraoral scanner technology is essential for any clinician to effectively scan the dental arch. There are pros and cons to features in an intraoral scanner that is commercially available. Though, there is no scanning technique, intraoral scanner, or other technologies at present to be progressively measured more precisely due to the nonexistence of reliable procedures or corresponding clinical studies. Though intraoral scanners are established on confocal technology, the prerequisite of capacious hardware substitutes such as software-based technology is exclusively for ergonomics, patient comfort, and manufacturer's cost. In future studies, we have to compare the scanning time, how accurate is captured image of the arch is, and the high definition, and color clarity of the image among the currently available Intraoral scanners worldwide.

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