The **12** Advantages Intraoral Scanning Brings to Your Orthodontic Practice
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Introduction

Intraoral scanners have been around for several years now. No longer considered new technology, they are impacting the workflow of clinicians as well as the lab. Digital models and clearer initial information at the onset of treatment mean better fitting appliances and higher quality outcomes at the conclusion of treatment. This data also results in fewer remakes, reduced office visits, easier collaboration, faster turnaround times, greater patient satisfaction and increased referrals.

This white paper examines the advantages that intraoral scanning brings to the orthodontic practice. Positioned to impact clinicians, labs and patients alike, intraoral scanning is changing everything about the way orthodontic treatment planning and appliance fabrication have traditionally been performed. It is improving efficiencies, reducing errors and enhancing communication with patients and across the treatment network.
Intraoral scanners provide a level of detail of the dentition and soft tissue not previously available to oral health professionals. This improvement in image quality leads to distortion-free digital models that some doctors feel result in appliances that fit more predictably than those fabricated using conventional methods. Better fitting appliances also result in higher quality treatment outcomes.

Intraoral scanners use video or still image capture, coupled with powerful software, to take images and fabricate virtual copies of the mouth. They do not use X-rays or cone beam computed tomography (CBCT). Patients do not always understand the difference between CBCT and a virtual scan, so it’s helpful to explain the distinction.

“On average, our appliances fabricated from digital scans require fewer adjustments prior to cementation than those fabricated from conventional means.”
—Dr. Christopher Harris
Harris Orthodontics, Charlotte, NC

A single imaging session from an intraoral scanner can:

- Produce models for records and diagnostics
- Eliminate the need for a conventional impression and stone model
- Provide instant educational information for the doctor as well as the patient
- Can reduce the number of appointments needed by 1-2 appointments when placing appliances that require band attachments

Once the scan is complete, the lab can receive digital files via the internet, print a working model from the digital data and then fabricate the appliance required.

With an intraoral scanner, the clinician can create an exceptionally accurate impression of the teeth while the brackets are still on. The brackets can be digitally removed as needed to create final retention appliances.

Please note: The orthodontic wires should be removed first if the scan will be used to digitally remove brackets and fabricate retainers for immediate seating at the de-bond appointment. If self-ligating brackets with doors or gates are in use, they should be closed before scanning.
Studies show digital impressions are beneficial in creating a more efficient workflow. While the scan itself (versus taking an impression) generates some time savings, it’s actually the additional steps associated with preparing for, working with and shipping traditional impressions/models to the lab that really make scanning more efficient. For example, contrast the impression steps in Figure 1. Keep in mind that the more steps there are, the more opportunities exist for the introduction of errors.

Some intraoral scanners feature a dedicated workflow for orthodontics. Clinicians benefit from an intuitive interface that is optimized for fast dual-arch acquisition—further facilitating a smooth user experience in the orthodontic office.

In addition, some intraoral scanners integrate with the clinician’s imaging and practice management systems. This integration enables clinicians to quickly access the information they need with minimal clicks, further streamlining their workflow.

**3. Reduced Lab Turnaround Times**

An improved workflow results in a process that is seamless from the moment the initial intraoral scan is taken. In most cases, it significantly shortens the total time required from impression to appliance delivery, saving valuable chair time for clinicians and reducing disruptions to daily routines for patients and their parents.
Once it receives the digital files from the intraoral scan, the lab can immediately communicate unmet needs to the office. If there is a question about the prescription or appliance, there is no lag time from shipping, which ultimately creates delays in fabrication.

**4. Fast Acquisition**

In terms of scanning speed, not all intraoral scanners are created equal. Some scan quickly but don’t offer a high level of accuracy. For others, the opposite is true: they scan more slowly but the accuracy of the output is very high. Still others offer the best of both worlds: high speed and high accuracy.

If the intraoral scanner includes an auto-locate feature, clinicians can rescan an area to fill in missing information—without starting over. Users can go back to any position in the mouth without indicating an exact location or following a specific direction. For experienced scanner operators, the need to rescan is minimal. But the ability to detect and correct defects in the data set, while the patient is still in the chair, is hugely beneficial to the clinician and the patient.

If the scanning range is broad enough, the intraoral scanner doesn’t have to remain at a fixed distance to produce optimal scans. Whether hovering or briefly resting the scanner on a tooth, clinicians can use whichever method they prefer without disrupting the flow or image capture process.

“When you invest in a scanner, you want something that’s easy to train on and you want to look for a company that’s going to stand behind its product.”

—Dr. Robert Waugh
Waugh & Allen Orthodontics, Athens, GA
5. Usability

Intraoral scanning eliminates the risk of patients gagging, an advantage for all parties involved. When the clinician performs a scan, if transient brushes with sensitive tissues occur, the clinician can simply move on and return in a more careful manner, recapturing that area after the patient has felt the accomplishment of the now nearly-complete scan. The experience is more pleasant for both the patient and the clinician than with traditional impression methods.

“If a patient is apprehensive about impressions, the scanner really puts their minds at ease. It allows them to relax and have a positive first clinical experience with your practice.”

—Dr. Lee Andrews
Rogers and Andrews Orthodontics, Augusta, GA

Intraoral scanner tips typically come in two sizes to accommodate mouths of all sizes. These tips are ideal for anterior and occlusal surface scanning or for pedodontic and adult scanning. If the scanner features a side-oriented tip, the clinician gains flexible choices in satisfying different clinical needs and user preferences. The side-oriented tip is designed to make it easier to obtain buccal surface scans, and the tip height is generally shorter than the standard tips. Side-oriented tips also enable greater access to the molars.

<table>
<thead>
<tr>
<th>STEP</th>
<th>SCAN-to-LAB</th>
<th>CONVENTIONAL IMPRESSIONS</th>
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<tbody>
<tr>
<td>1</td>
<td>Turn on scanner</td>
<td>Prep Materials</td>
</tr>
<tr>
<td>2</td>
<td>Seat patient; attach tip</td>
<td>Seat patient; try in tray</td>
</tr>
<tr>
<td>3</td>
<td>Scan arches</td>
<td>Mix materials (twice)</td>
</tr>
<tr>
<td>4</td>
<td>Complete Rx</td>
<td>Seat tray (twice)</td>
</tr>
<tr>
<td>5</td>
<td>Upload files</td>
<td>Disinfect impressions</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>Pour model (twice)</td>
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<tr>
<td>7</td>
<td></td>
<td>Trim model (twice)</td>
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<tr>
<td>8</td>
<td></td>
<td>Complete Rx</td>
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<tr>
<td>9</td>
<td></td>
<td>Package materials</td>
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<tr>
<td>10</td>
<td></td>
<td>Ship package</td>
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Figure 3: Techniques for creating an impression: traditional versus scan-to-lab
One of the fallbacks of using alginate and polyvinyl siloxane (PVS) impressions is that the techniques for each vary, while the technique for acquiring digital impressions with an intraoral scanner is always the same for all patients. When using a digital intraoral scanner, one impression capture technique covers all appliances, from simple study models to the Herbst® appliance or palatal expanders. There are only minor modifications of what areas to scan, like scanning the palate for making expanders but not for when aligners are being fabricated.

The ability to communicate easily with third parties facilitates the treatment planning process. The file format accepted (either .STL or .PLY) varies from lab to lab. As a result, it is beneficial for the scanner’s output to be in an open file format, so that clinicians are not limited to only labs that accept a certain type of file.

Within minutes of scanning, the lab receives these files and can open them in the design software of its choice. A quick phone call or remote viewing call from the lab to the orthodontist enables both parties to work together, even before the patient has left the appointment.

When comparing the true cost of traditional impressions versus digital impressions, there are several factors to consider. If the clinician has to remake an impression or appliance, the cost of that step of treatment is not merely doubled—assuming the lab doesn’t charge for a remake. For example, if an assistant remakes a PVS impression, the cost in time and expense is three-fold. See Figures 4-5.

Figure 4: Lower 7s missed in this expensive PVS impression.
From the lab’s perspective, the impression-taking skills of their clients present a significant challenge. As many as 25 percent of the impressions arriving at the lab are inadequate, due to a failure to follow guidelines and a lack of evaluating impressions before sending them to the lab. With digital impressions, it is possible to immediately send the impression to the lab for review. If there is an issue with the impression, the practice can re-scan the patient while he or she is still in the chair.

To calculate the actual cost of storing stone models, clinicians should consider cataloging time and space requirements. The effort required to categorize models, box them up and move them to the designated storage area is typically not an efficient use of staff time. If the office is in a high-rent district where space is priced at a real premium, storage can be very cost prohibitive.

“The problem with traditional impressions is the potential for distortions. In the past, if an appliance didn’t fit, it was never because the lab made a mistake. It was due to an inaccuracy with the impression.”

—Dr. Christopher Harris
Harris Orthodontics, Charlotte, NC
During pre-exam office tours, there’s often a “wow” factor when patients see an intraoral scanner in action. Once they understand that this technology replaces traditional impressions before and after treatment, their enthusiasm further increases.

When parents observe the image acquisition process and the resulting images—as well as how calm and cooperative their children are—they often become instant advocates for the state-of-the-art technology and the practice that uses it. In addition to being impressive, the images produced by the intraoral scanner help patients and parents quickly comprehend the treatment plan.

The digital model is presentation-ready as soon as scanning is complete. Thanks to the educational aspect of the model and a better understanding of their clinical situation, patients feel more confident about the clinician’s approach. Case acceptance increases as a result. In addition, the same digital scan used for case presentation can be used to create an appliance—if one is needed. With the traditional method, typically the patient is sent home so that the office can create the stone models, and a follow up appointment is scheduled to review the model at a later date. These extra steps are eliminated with digital impressions, and the model can be reviewed immediately after it is captured with the digital intraoral scanner.

Some scanners are more portable than others. If they’re tethered to a cart or trolley, it can be awkward to move them from one operatory to another. For offices with multiple locations, the task of transporting them can be quite cumbersome.

Some scanners offer USB plug-and-play and can be connected directly to a laptop, so there’s no cart to contend with. The scanner is simply plugged directly into the laptop or chairside computer. It can easily be moved from patient to patient, floor to floor and across office locations.
Asepsis is a critical concern for orthodontists and maintaining an aseptic field of treatment is always a top-of-mind issue. The Centers for Disease Control (CDC) recommend that heat-tolerant semi-critical items in dentistry (items that come into contact with mucous membranes) be sterilized using heat. If heat sensitive, dental healthcare practitioners should replace semi-critical items with a heat-tolerant or disposable alternative.³

This recommendation underscores the need for the disinfecting practices of the intraoral scanner to include heat sterilization. Scanner tips should be autoclavable to promote optimal sterilization for infection control. Patients appreciate the peace of mind that comes from seeing the tip removed from the sterilization packet and placed on the scanner.
Conclusion

Intraoral scanners are having a tremendous impact on the practice of orthodontics. From fewer appointments to quicker turnaround times at the lab to improved outcomes and happier patients, intraoral scanning and digital models are setting the stage for greater efficiencies across the board.

The simplicity of the scan-to-lab process—with a speedier fabrication process, no remakes or botched pour-ups, no need to package models in boxes, and no potential damage or loss in transit—is transformational to the field of orthodontics. Clinicians who adopt this technology are likely to discontinue the use of impression material in their practices altogether.
What Sets the CS 3600 Intraoral Scanner Apart?

The CS 3600, Carestream Dental’s newest intraoral scanner, integrates seamlessly into the orthodontist’s existing environment, streamlining the workflow, simplifying the impression process and improving patient comfort. While other manufacturers may offer tips in more than one size, the CS 3600 has rounded tips in two configurations. The difference is the innovative side tip, which features a short tip height. This allows for better access to the buccal region and the molars.

The highly intuitive, user-friendly CS 3600 satisfies all the features and functions on the orthodontist’s intraoral scanning wish list.

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<tr>
<th>CS 3600 Intraoral Scanner</th>
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<td>Features</td>
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<td>High-speed continuous scanning</td>
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<td>Intelligent Matching System</td>
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<tr>
<td>Automatic bite registration</td>
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<tr>
<td>Feature</td>
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| Full HD 3D images | • Realistically reflects the current dental situation  
• Facilitates case analysis, review and communication  
• Boosts treatment plan acceptance |
| Automatic 2D image capture/storage | • Increases efficiency by eliminating the need to capture additional images  
• Aids in tooth characterization or patient communication  
• Documents oral hygiene |
| Scanning flexibility | • Enables users to rest the scanner on patient’s teeth or hover over them, with no fixed distance requirement between the scanner and the occlusal surface |
| Portability | • Connects via USB to PC (no trolley necessary), allowing easy transport between operatories or office locations |
| Two-tip configuration | • Facilitates better access to buccal region and molars |
| Autoclavable/reusable capability | • Aids in infection control  
• Reduces need to purchase consumables (reusable up to 20 times) |
| Built-in heater | • Eliminates fogging while helping to facilitate full arch scanning |
| Advanced ergonomic design | • Provides the ideal grip for effortless scanning  
• Is lightweight, making it comfortable and easy to manipulate |
| Open system output | • Ensures file compatibility with lab of users’ choice  
• Facilitates communication and file transfer with users’ lab and referrals |
**Figure 6: Who Benefits From Digital Impressions?**

| ✔️ | Dedicated orthodontic workflow | • Speeds and simplifies dual-arch acquisition |
|    | Integration with leading imaging and practice management software | • Streamlines workflow |

“*Since using the CS 3600, I’ve been impressed, not only with the speed, but with the accuracy of the scanner. We have made several appliances using the digital files from the CS 3600, and they tend to fit better than appliances made using our traditional impressions.*”

—Dr. Mark Causey  
Causey Orthodontics, Cumming, GA
ABOUT CARESTREAM DENTAL

From the first dental radiographic film and the world’s first digital intraoral sensors to cutting-edge low-dose 3D imaging technology, Carestream Dental consistently invests in research and development to continue innovations in dentistry that better address and anticipate the needs of dental professionals across the globe.

Our primary goal is to help dental health practices deliver diagnostic excellence through the use of humanized technology and streamlined workflows. Our product portfolio includes specialty-specific practice management software; imaging software with specialty-specific workflows; intraoral digital impression systems; panoramic and cephalometric imaging; and 3D imaging systems, as well as other intraoral and extraoral imaging equipment.

For more than 100 years, Carestream Dental has provided dental professionals across the globe with the imaging tools and information they need to work more efficiently and better serve their patients. Currently, you can find Carestream Dental products in 7 out of 10 dental practices worldwide and in over 108 countries. Discover why those practitioners chose Carestream Dental: visit carestreamdental.com.

Sources


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