The scan-to-lab treatment guide...

Optimizing clinical efficiency through digital orthodontic technology

Carestream Dental

Specialty Appliances
For over 100 years, Carestream Dental has provided dental professionals across the globe with the imaging and information tools they need to work more efficiently and better serve their patients. Currently, Carestream Dental products can be found in 7 out of 10 dental practices worldwide and are sold in over 108 countries.

Helping orthodontic practices succeed through the use of technology is a primary Carestream Dental goal. Devoted to delivering diagnostic excellence, humanized technology, and streamlined workflows, Carestream Dental’s dental product portfolio includes: orthodontic-specific practice management software, orthodontic imaging software, intraoral digital impression systems, panoramic and cephalometric imaging, and 3D imaging systems, as well as other intraoral and extraoral imaging equipment.

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 the field of orthodontics and to better address and anticipate the needs of dental professionals in general.

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Specialty Appliances is a full service orthodontic laboratory, producing more than 250 premier products. Since 1981, Specialty has focused on developing and manufacturing top quality orthodontic appliances for children and adults. Their relentless commitment to first rate appliances sets them apart from other labs. Specialty is one of the very few US orthodontic laboratories to receive ISO 13485 certification, ensuring the highest quality laboratory processes and products that your patients deserve.

Specialty Appliances is committed to research and development and always looking for effective ways to improve orthodontic treatment. This innovative approach has led to laboratory inventions like the MiniScope® Herbst, AppleCore™ Screws, ROC Crowns, Ratcheting Expansion Screw, Rapid Molar Distalizers, Digital Positioners, Clear Image® Aligners and many others.

Digital technology is changing the orthodontic industry. Since 2006, Specialty Appliances has been recognized as the leading digital orthodontic laboratory. We believe there is more to “being digital” than just owning a 3D printer. Specialty is developing new standards for the future through strategic partnerships with innovative orthodontists and leading CAD software companies. www.specialtyappliances.com

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INTRODUCTION: A CLINICAL CASE EXAMPLE...

Consider this patient case that shows how combining the power and benefits of intraoral scanning with state-of-the-art orthodontic laboratory services is a win-win for your practice. By following this example, you can save yourself and your patients the expense and inconvenience of an additional office visit for debanding.

“Frank Ludlow” is an executive who travels a lot and values his time. Your treatment for him progressed well. He paid a fee of $6000 and treatment took 11 appointments. As you approach his treatment finish, rather than schedule Mr. Ludlow for the usual two-appointment process to deband and retain, you simplify the process to a single deband visit to deliver his retainers at that visit. In other words, the day you decide Frank is ready to deband, you begin by scanning his upper and lower arches that day with his braces on, and deliver his retainers at his deband appointment in about 10 days. Busy Mr. Ludlow was saved from needing that second deband appointment to fit retainers.

By combining the technologies of the CS3500 intraoral scanner with Specialty Appliances’ digital lab abilities, here is how this one-visit debonding and retainer delivery is accomplished:

1. **FINAL APPOINTMENT**: Once you determine the braces are ready to be removed (and after placing an upper lingual braided wire retainer), take a digital scan and upload it to Specialty Appliances; then schedule his debonding appointment.

2. **LAB**: Specialty Appliances uses advanced software on the virtual models made from the scan and digitally removes all of the braces. They then print extremely accurate 3D models and fabricate the GUARDIAN invisible retainers.

3. **DEBONDING**: At the debonding visit you simply remove his braces and seat the upper and lower clear retainers. You may optionally elect to have the lab prepare a lower lingual bonded wire retainer as well to place at this appointment.

Mr. Ludlow leaves with primary and backup GUARDIAN invisible retainers. Not only was he saved from a second debonding visit, the backup GUARDIAN invisible retainer option might one day prevent him from needing another appointment for new impressions, were he to lose or damage his primary retainer while traveling. He would simply use his backup retainer while a new one was fabricated by Specialty Appliances from archived virtual models. The replacement could then be mailed to him.

You can read more about the GUARDIAN invisible retainer program on page 13 of this Treatment Guide, or visit [www.specialtyappliances.com](http://www.specialtyappliances.com).
Imagine not having digital radiography or powerful practice management software that helps increase efficiency in both the business and clinical areas. Similarly, using intraoral scanning and an orthodontic lab’s ability to fabricate appliances from virtual models is now within the reach of every practice saving time and money. It has been said you can have any two of these three elements: great results, fast treatment time, and inexpensive costs; but, using the intraoral scanner in concert with the digital orthodontic lab enables all three. It is no longer a matter of “if” you will use an intraoral scanner but “when,” as was the case with digital radiography years ago. If other orthodontists in your community are using intraoral scanning, they will tout its superiority and benefits over conventional impressions; various marketing tactics are covered in this treatment guide, which also details how the process of scanning-to-lab changes the way practices deliver orthodontic care to patients.

THE CARESTREAM CS3500 (above left) is recommended for several reasons:

1. USB plug-and-play makes it easy to port between chairs and locations.
2. No additional cart is needed.
3. Handpiece is small, lightweight, and comfortable to use.
4. Selectable tip sizes for youth and adult arches, especially helpful in orthodontics where a majority of patients are young.
5. Tips can be sterilized between patients.
6. Accuracy, price, and ease-of-use.
7. Powder-free, meaning there is no need to dust a layer of powder over the anatomy to be scanned.
8. All scans are available in the desirable open source STL format at no additional charge.

RAPID LAB TURNAROUND... The “START TO FINISH” flow of intraoral scanning to Specialty Appliances summarizes the many benefits described in this treatment guide. Below we see how digital technology [TOP] saves as many as five days of wait time vs. the traditional impression/plaster model process [BOTTOM].
**INTRAORAL SCANNING & THE DIGITAL LAB...**

If you have to remake an impression or an appliance, you may mentally calculate that it doubles the cost of that step of treatment, assuming the lab doesn’t charge for a remake. In actuality the cost is three-fold.

Think about this: For an assistant to remake a polyvinylsiloxane (PVS) impression, the cost in time and expense is three-fold because:

1) That first impression is lost, costing both time and money;
2) The remake costs time and expense; and,
3) An assistant is not available for a new patient and/or procedure while attending to the remake.

One of the many rich features of the CS3500 is its ability to simply rescan an area to “fill in a hole,” so to speak. This ease of capturing missing data and having the software ‘stitch it in’ where it belongs is impressive. With the CS3500’s short learning curve, the operator quickly becomes skilled at its use. The occurrence of these minor ‘retakes’ (if you still want to carry that archaic term into digital technology) is minimal. This digital 'defect' shown is easily corrected with a rescan of just the hole, not the entire mouth. =

Being able to detect and correct defects while the patient is still with you means they don’t have to return later.

**GOING DIGITAL WITH THE ORTHODONTIC LAB...**

Digital technology holds tremendous promise for the orthodontic practice in terms of improving workflow and reducing redundancy. A single imaging session from an intraoral scanner can produce models for records and diagnostics, can eliminate the need for an impression and stone model for the lab, and can provide instant educational information for the doctor and the patient. From the laboratory standpoint, Specialty Appliances is set up to receive digital files via the Internet, print a working model from the digital data, and then fabricate any appliance required. The process is seamless from your initial intraoral scan and, in most cases, reduces the total time required from ‘impression’ to delivery of your appliances.

**CASE ACCEPTANCE: TAKE ADVANTAGE OF A “MARKETING MOMENT”...**

As an example of how your office uses the latest and greatest technology, you will want to show off your intraoral scanner during your patients’ pre-exam office tours. Another way to demonstrate the cutting edge technology used in your office is to show a video of the procedure in progress. When patients and parents understand it replaces the ‘goop’ of having to have impressions made (before and after treatment), the clock ticks closer toward your treatment coordinator getting a “YES” to “Are you ready to begin?”
GAGGING: A THING OF THE PAST...

If you ask most orthodontic assistants what is their least-favorite duty, most say it’s taking impressions – especially of the upper arch. Maybe worse is the process of initially learning how to make impressions (or having to teach others). Having to capture posterior anatomy increases the risk of the patient gagging and, because this is usually done within the first few appointments, it often leaves the patient with a feeling of having a bad experience. If the patient gags, and in the worst case scenario regurgitates, the situation is messy and embarrassing for the patient and assistant. The patient then becomes more anxious about the retake. Conversely with scanning, when transient brushes with sensitive tissues occur, the operator simply moves on and returns in a more careful manner, recapturing that area after the patient has felt the accomplishment of the now near-completed scan.

PATIENT CONTROL...

A better sense of security helps the patient maintain some feeling of control while the scanning is in progress, especially in younger patients. The operator demonstrates visually how it is simply a camera, showing various never-before-seen features of their mouth. Plus, you can stop and start the scan as needed, providing the ultimate in sophisticated, high-touch patient care. It’s the ideal moment to talk up the technology and show them another reason why they can be proud for choosing you as their orthodontist.

HIGH-TECH PATIENT CARE...

In this age of technology, where people often toss out the old to get the latest version, the CS3500 scanner puts on an impressive show. When a parent is present for the scan, show it off. They become ambassadors for your practice when they see their child calm and cooperative about having impressions made. Let them see the screen as you scan. You may even want to have it projected onto a large LCD screen. We may become complacent about the technology, but for the patient seeing it for the first time it is quite a show; never underestimate that. Intraoral scanning and digital submission to the orthodontic lab is becoming a commonplace, forever replacing conventional impressions. So, remember to play it up. After all, if you’re providing the best, make sure they KNOW it’s the best!
BEYOND ESTHETICS: CLEANLINESS...

Adult patients appreciate intraoral scans vs. conventional impressions, especially at lunchtime appointments or otherwise in the middle of a workday. Imagine them getting home at the end of the day to find alginate dried-on to their cheek, or flecks of alginate on their clothing. Residual impression material between the teeth is not great for marketing, either. Naturally, you believe your assistants make sure these unfortunate events don’t happen, but they DO happen. Don’t give any patient a reason to not recommend your practice. How do you do that? An intraoral scanner avoids use of these materials that can leave embarrassing “residuals.”

FEWER UNFORTUNATE RETURN VISITS...

Finally, one big potential benefit for patients is preventing them from having to return to the office for another appointment for an impression because of avoidable errors introduced during the pour-up process, or due to damage or loss in transit to the lab. We respect patients’ time and appreciate them leaving school or work to come in for visits. It sets bad precedent when an appointment early in treatment requires repeating. The process of scanning-to-lab allows each step to be verified as complete and viable. And which step is the most important? The step you are doing “NOW.” When using intraoral scanning instead of conventional impressions, coupled with the digital services of a state-of-the-art orthodontic laboratory, every “NOW” step as well as the next, can be taken confidently.

OTHER BENEFITS OF SCANNING & THE DIGITAL LAB...

CONVENIENCE FOR YOUR TEAM...

The Carestream CS3500 scanner is small and lightweight, so it can be easily transferred from one station to another. The USB plug and play feature allows the assistant to quickly change the location of the scanner without having to move a bulky cart. Instead of interrupting an appointment to move the patient, they can stay in their current chair and have the scanner brought to them.

STANDARDIZED TECHNIQUES...

Another benefit of using intraoral scans to make models and appliances is that the procedure is largely the same for all patients and appliances. When taking impressions an assistant has to learn different techniques for alginate and PVS impressions, including moisture sensitivity, mixing, loading trays, placement methods, etc. With the Carestream CS3500 a scan is a scan; one 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.
INTUITIVE & EASY TO LEARN...

The Carestream CS3500 uses high-tech colored lights to help focus on both the patient and the scan in progress – “what you see is what you get.” As long as the light is green, it is reading and writing what you are tracing with the handpiece. You can then focus totally on the patient, if needed. The “Guide” mode setting enables a green or red box on your monitor screen, mimicking the light on the scanner. This makes it possible to perform the scan by either watching the scanner or focusing on the monitor. When scanning the upper arch you may find it easier to look at the scanner to see what is being scanned, and easier to look at the monitor while scanning the lower arch (especially the occlusal surfaces).

SIMPLE SCAN-TO-LAB LOGISTICS...

Your team is going to love the simplicity of the scan-to-lab process, with no remakes or botched pour-ups, no need to package models in boxes and risk damage or loss in transit, and more. Being able to upload digital files rather than mailing cases to the lab just adds to the ease. Twenty-first century orthodontics demands using intraoral scanning and digital lab technology. Once your team discovers how great it is, they will look at it like they do digital x-rays. After all, who wants to return to the darkroom and the automatic processor? Mixing and taking impressions, and then pouring up the models, will also become as antiquated in the very near future.

Specialty Appliances appreciates the high-definition associated with intraoral scans, as opposed to working with impressions or stone models. Potential errors introduced while taking impressions, pouring models, and shipping the models are eliminated and makes everyone’s experience more enjoyable: from patient, to the lab, to the assistant, and finally for the doctor. And remember: (Q) What is the most important step? (A) The one you are performing NOW...

Intraoral scanning is different... It’s innocuous and actually fun!
BENEFIT: HIGH-DEFINITION...

Doctors appreciate the geometric and dimensional stabilities of virtual vs. stone models. They can access them from anywhere with no physical storage needs. And because they can magnify them for discriminating viewing, the ‘WOW’ factor and teaching ability can really benefit the doctor.

BENEFIT: COMPOUNDED TIME VALUE...

The old saying “Time is more precious than money” is certainly true when using digital technology in orthodontics. Time-wise, the benefit of using an intraoral scanner with digital lab services over impressions allows your team to spend more time with patients. Consider again the triple cost of a remake; the time lost for that assistant seeing a new patient is forever gone. The speed by which the scan files are sent to the lab via the Internet buys an incalculable amount of time, especially when multiplied by hundreds of patients over the years.

BENEFIT: INCREASED ROI (LOWER MATERIAL COSTS)...

There’s no question that using an intraoral scanner saves you money as well. When you compare the costs over an extended period of time by amortizing the investment in the scanner, the return on the investment is impressive:

CONVENTIONAL IMPRESSIONS... 600 starts + 600 finishes/year = 1,200 impressions X $25/set in impression costs = ~$30,000 in materials/year...

INTRAORAL SCANNER... A CS3500 scanner costs $450/month @ 4% for 60 months = $5,400/year + $50/month for new tips = $6,000/year (1/5th of what conventional impressions cost)...

Finally, consider that, after the 5th year of payments for the scanner, the only cost is for new tips. If you provide the GUARDIAN retainer service to your patients, just 60 cases (120 individual retainers) might be all that is needed to recoup your investment in your scanner.

ACCURACY+...

Most accuracy studies focus on prosthetic and restorative cases. Some reported that crowns made from digital impressions were preferred over ones fabricated from conventional impressions, and were easier to seat.*

An in vitro study showed digital impressions were equal to or exceeded conventional impression accuracy.**

Of course, the many deleted steps of working with conventional impressions helps improve accuracy in the clinical practice in untold numbers of ways: i.e., no distorted impressions or stone models. The CS3500’s resolution exceeds the minimums required by orthodontic laboratories.


**IMPORTANT POINT...** Always mention to the patient in some way that the intraoral scan uses no x-ray. Instead, it uses video, coupled with powerful software, to take the imagery and fabricate virtual copies of the mouth. This is important to cover with every patient since some treatment systems use cone beam CT to generate appliances. We often assume that lay people understand the differences between x-ray and the virtual scan; in fact, they may think the scan IS using x-ray, when it’s not.

...it’s time to move forward.

**BENEFIT: TIME SAVINGS ARE MOSTLY “IN THE DETAILS”...**

Studies show digital impressions to be “beneficial in establishing a more time-efficient work flow.”¹ While it seems like the actual scan vs. taking an impression generates the time savings, it’s actually in the additional steps associated with preparing for, working with, and shipping conventional impressions or models to the lab that make scanning so attractive and more efficient. For example, contrast the impression steps below (including assistant and patient time demands) to intraoral scans; mentally calculate the time associated with each step. Remember, the more steps there are, the more opportunities exist for issues that add inefficiencies.

<table>
<thead>
<tr>
<th><strong>STEP</strong></th>
<th><strong>SCAN-to-LAB</strong></th>
<th><strong>IMPRESSIONS</strong></th>
</tr>
</thead>
<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>
</tr>
<tr>
<td>7</td>
<td>-</td>
<td>Trim model (twice)</td>
</tr>
<tr>
<td>8</td>
<td>-</td>
<td>Complete Rx</td>
</tr>
<tr>
<td>9</td>
<td>-</td>
<td>Package materials</td>
</tr>
<tr>
<td>10</td>
<td>-</td>
<td>Ship package</td>
</tr>
</tbody>
</table>

**Half as many steps are needed when using digital technology.**

You can easily see that using the intraoral scanner to create virtual models you digitally send to the lab to fabricate resin models using 3D printing not only saves time, it eliminates many steps that can introduce errors, requiring retaking impressions and wasting time. In addition, it’s easier to store virtual models in patients’ digital records than in boxes on shelves.

BENEFIT: REDUCED IN-HOUSE LAB DEMANDS...

There are no added financial costs of communicating the scan files to the orthodontic lab, because ubiquitous Internet is one of a practice’s fixed costs. Comparing the steps shown before reveals just how much time is actually saved when digitally transmitting scan files to the orthodontic lab, as opposed to requiring team members to physically prepare and send impressions or models. So, just as digital radiography is saving doctors thousands of dollars each year on materials and staffing costs, the digital lab is as well. As shown earlier, once the scanner is paid for, the already great return on investment increases dramatically.

BENEFIT: PVS-QUALITY MODELS WITH BRACES...

Other benefits of intraoral scanning include being able to make exceptionally accurate impressions of the teeth while the braces are still on. A final scan made at treatment’s end with the appliances in place creates PVS-quality virtual models to document the state of affairs, not just regarding treatment results, but also the quality and integrity of the appliances that are actually in place.

NOTE: The orthodontic wires should be removed first if the scan is being made for the fabrication of GUARDIAN retainers. If self-ligating brackets with doors or gates are in use, they should be closed before scanning.

OTHER CONSIDERATIONS...

BENEFIT: IMPROVED COMMUNICATIONS & IMMEDIATE FEEDBACK FROM THE LAB...

Another advantage is that the orthodontic lab can immediately communicate unmet needs to the office upon receipt of the digital files. If there is a question about the prescription or appliance, there is no lag time that would otherwise be involved in shipping, which ultimately creates delays in fabrication.

EVERYONE BENEFITS: ASEPSIS...

Asepsis is a critical current topic of interest in orthodontics. Patients watch every move. As always, the fewer steps and moving parts the better the ability to maintain an aseptic field of treatment. The CS3500 scanner has interchangeable tips that can be sterilized and reused approximately 20 times. Nothing is as reassuring to a patient as seeing a sterile packet containing what is going to be used in their mouth being opened with gloved hands. Of course, every person who doesn’t handle the now non-existent impression, from assistant to in-house lab tech to orthodontic lab personnel, benefits too!
SCANNING SPECIFICS...

SCHEDULING LOGISTICS...

Once an operator is familiar with the scanning process, plan for a one hour appointment to prepare the treatment area and patient, make the scan, complete the Rx, and upload the data to the lab. As assistants become more proficient with the scanner, the scanning process should take about half that time for both arches. Remember, the scan-to-lab-to-digital lab submission can save many days over the usual time experienced waiting for an appliance to be returned for patient delivery; keep that in mind when scheduling patients for delivery of their appliances.

SCAN APPOINTMENT LOGISTICS...

Make it a habit when seating the patient to immediately open the sterile packet with the correct tips in their view and place a tip on the scanner’s wand. This begins the 2-3 minute warmup process so the tip is ready and doesn’t fog when you start to scan. After placing the tip, the assistant completes the necessary steps within the Carestream or other practice management software to initiate the scan into the patient’s chart, and then explains the procedure to the patient. By the time these short steps are completed, the tip is warmed up and ready for use.

WHAT TO SCAN: Always keep the desired appliance in mind while scanning, visualizing areas that will be involved in its fabrication, delivery, and use. For instance, if the appliance needed is a palatal expander, Herbst® appliance with an expander, or a Hawley retainer, a scan including the palate is needed. You would also want to capture 7-10mm of gingiva beyond the margins with the teeth for the Herbst® appliance. However, there is no reason to scan the palate for clear aligners or GUARDIAN retainers. Instead, just 2-3mm of the gingiva will be needed. Also, some appliances do not require the second molars to be scanned.

HOW TO SCAN: It is suggested to use the large tip for the majority of the scan so the assistant can proceed quickly along the arch, overlapping captures by about 30%. In situations like scanning second molars, it is more efficient to go ahead and switch to using the small tip, making it easier for the assistant and more comfortable for the patient. If both tips are to be used, start with the large tip and capture the majority of the arches. When as much as can be captured with the large tip is completed, switch to the small tip and begin scanning at the point where the large tip left off, working from mesial to distal so the scanner can recognize the anatomy. In other words, if a portion of the first molar was completed with the large tip, start with that same portion of the first molar with the small tip and move posteriorly to continue the scan, as opposed to beginning with the distal of the second molar and moving forward. If you think of it as the scanner “stitching together” each capture, it is easy to understand why each new capture must have a previous capture to which it can link. Play around with holding the scanner’s wand in different positions. It is best to find a position so that a finger is on one of the acquisition buttons during the scan; thus, the button can be depressed without having to change your grip. The wand is so lightweight it can even be held like a pencil.
LET THE PATIENT HELP...

Experienced assistants know how to have the patient ‘help’ in the process of taking impressions, or when working in the most posterior areas of the mouth, by manipulating their jaws and lips in various ways, enabling better access for the assistant. For example, have the patient close slightly to relax the lips when scanning in the anterior segments. While scanning in the posterior segments the patient should be asked to relax their cheeks. Also, in addition to closing slightly or relaxing their cheeks, when scanning the lower jaw you can ask the patient to slide it toward the side where you are scanning, creating more room. Also, cheek retractors work great. You can ask the patient to hold them in place for you during your scan.

RECEIPT OF APPLIANCES FROM LAB...

As usual, always carefully evaluate the appliance on and off the model before the patient’s delivery. Look for flash or undercuts and address them before seating your patient, and then verify it by trying it in the patient’s mouth.

APPLIANCE DELIVERY...

If an assistant encounters any issue delivering an appliance made from 3D-printed models, make sure they attempt to discern its nature before assuming a remake is needed, just as they would with conventional impression-based methods. For instance, when participating in the GUARDIAN invisible retainer program mentioned next in this Treatment Guide, you should manually fit the backup retainer too, verifying the patient can insert and remove both easily. If the retainer is extended too far from the incisal edges it may require a specific insertion/removal trajectory for the patient due to undercuts. They may later errantly assume it doesn’t fit. Simply trimming a millimeter or two off the edge may be all that is needed now to avoid an unnecessary remake later.

CLINICAL LAYOUT FOR ERGONOMICS & EFFICIENCY...

If your scans are primarily captured in the same location in the clinic rather than multiple locations, consider using an over-the-patient pole-mounted laptop tray. It provides uncompromised access for the operator while allowing the patient to see the screen as well. Another option is a slave monitor to which the laptop’s screen is cloned. This second monitor can be mounted fairly low on a wall at the patient’s feet or suspended from the ceiling, allowing the operator to easily view the scanning progress as well as a parent to see the high-tech process in action.

“CHANGE” AND YOUR TEAM...

Change can be scary to people who prefer staying in “comfort zones” and the status quo. It’s natural for some team members to express uncertainty about evolving to intraoral scanning. The best way to manage their fear is to listen and mirror it back to them, hearing their concerns without necessarily agreeing with them. Once they recognize the elimination of those obstacles associated with making impressions, such as gagging, remakes, having to pour models, etc., their acceptance will be as great as when they fully embraced digital radiography.
THE GUARDIAN RETENTION PROGRAM
(THAT ALONE CAN PAY FOR YOUR SCANNER)...

Specialty Appliances’ GUARDIAN invisible retainer system protects your patients’ beautiful smiles while generating new revenue for your practice. Specialty Appliances uses advanced 3D digital technology to create and deliver GUARDIAN invisible slipcover retainers to your office before the actual debonding appointment. The GUARDIAN system includes multiple invisible retainers fabricated from acrylic 3D printed models that can be used to create a lifetime of replacement retainers and eliminate the need for new impressions.

Poor patient compliance post-treatment can result in degraded esthetics, which can unfairly reflect poorly on your good work. The key to maintaining a healthy smile and great alignment is to retain. People can lose retainers and can get too busy to replace them due to the inconvenience; this is when relapse occurs.

Specialty Appliances’ GUARDIAN invisible retainer system takes the hassle out of replacing retainers, and thereby protects your beautiful treatment. It simply requires that you scan a patient’s teeth and store the virtual models in their records. After uploading to Specialty Appliances, they use your scan to make up to four retainers. The primary retainer is for the patient to use immediately and backups are given to use in case something happens to their primary retainer.

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**BENEFITS...**

- Deliver the GUARDIAN invisible retainers the same day as debonding...
- Reduce the risk of tooth movement with same day retainer delivery...
- Minor anterior tooth adjustments can be built into GUARDIAN invisible retainers...
- Create a proven retention system that fights relapse and generates new revenue...
- You no longer have to take multiple impressions or work with brittle stone models...
- Eliminate the traditional retainer delivery appointment, creating time back in your schedule...
- You no longer have to make a new impression if a patient loses a retainer, nor have to worry about their teeth shifting...

---

The key is to maintain an active retainer & always have a backup.
IF A PATIENT LOSES A RETAINER...

If a patient loses their retainer, they immediately have a backup and simply call your office to order a replacement that is made from the stored virtual model. There are no more worries about not having a retainer available at all times. What is so novel about this is the patient doesn't have to come back for a new impression as long as they have been diligent with retention. There is a minimal charge for the replacement that you can either mail to the patient or they can pick it up at your office.

It is important to remind patients that no new dentistry can be done without modifying this retention system. Should minor tooth changes occur the retainer may not fit properly. Other than simply wearing their retainers as prescribed, this is the only obligation on the patient to make sure they always have a well-fitting retainer for after treatment. This program offers long term stability no matter where the patient is, even if they move away. Without this program they would have to come into an office for impressions and the replacement retainer fee would likely be more, especially if at an orthodontic office that did not provide the original treatment. The GUARDIAN invisible retainer program can be thought of as great insurance.

THERE IS MORE...

You can take advantage of GUARDIAN to include direct or indirectly bonded lingual retainers (below left), perform minor teeth resets (below center), include pontics (below right), and more. Just let Specialty Appliances know what is needed.

AFFORDABILITY...

Keep the program fee affordable (~$250.00/arch) to encourage patient acceptance. This fee covers setup, virtual model storage, and lifetime use of the service as long as they comply with wearing retainers, of course. Should a replacement retainer be needed, it can be provided at minimal cost (~$50.00 per arch).

Visit www.specialtyappliances.com for more information.
THE QUICK “1-2-3” OF SCANNING...

> Press power button (#5) for 1 second to turn CS3500 on.

1. **DISPOSABLE TIP:** The tip can be installed facing upward or downward. Tips come in two sizes; use the smaller tip for tight areas or smaller mouths.

2. **ACQUISITION BUTTONS:** You can choose to press the button to scan and acquire a 3D image. The CS 3500 is set in auto acquisition by default, where the CS 3500 automatically begins the acquisition once it is stable and the image is clear. To make acquire a single capture, simply press the button once to acquire a single view. To keep the CS 3500 in manual acquisition mode, deselect auto capture in the Preferences window.

3. **MODE BUTTON:** Press the button to switch between upper or lower arch and the bite registration mode.

4. **MODE INDICATORS:** A light indicating the upper or lower arch scan mode or the bite registration mode. The POWER BUTTON turns from red to green when the acquisition interface is open and you are ready to begin. Orange = sleep mode.

5. **USB Cable:** One end of the cable is hard-wired to the bottom of the CS 3500, and the other end is inserted in the computer's USB port.

6. **USB Connection** is established when blue. **POWER ADAPTER:** One end of the adapter is inserted in the jack on the USB plug, and the other end is inserted in the power outlet.
PEARLS…

WHEN SCANNING FOR DIGITAL LAB WORK, KEEP THESE POINTS IN MIND…

BEFORE SCANNING…

- Prepare and have ready a small tip to better enable access to the second molars, etc.
- Provide a hand mirror for the patient to use in assisting with requested jaw movements.
- If using a laptop for the scanner, a wireless keyboard and mouse might be helpful.
- Always have your patient brush their teeth well before beginning.
- Make sure the teeth and the areas being scanned are dry and free of saliva bubbles.
- Lean your patient back so any saliva that collects is in the posterior segments.
- If the tip is not inserted completely, on the upper corner of the monitor a red “X” appears over a picture of the scanner. Once the tip is inserted properly there will be no picture.

DURING THE SCANNING…

- Begin with the upper arch, if both arches are to be scanned.
- Keep in mind the intended appliance(s) to be made and scan exactly what’s needed.
- In addition to the operator having a steady hand, the patient must also be still.
- Occasionally you may need to dry off your scanner’s mirror. If you rinse it make sure the wand’s buttons don’t get wet.
- The orthodontic wires must be removed first, if the scan is for GUARDIAN retainers where the braces are removed digitally. If self-ligating brackets are in place, close any open doors or gates.
- Scan each surface of the entire arch (occlusal, facial, lingual) and THEN go back over and fill in any ‘holes.’ Resist the urge to fill in holes as you progress through the scan, since most are eliminated when scanning other surfaces.
- Maximize scanning with the large tip, switching to the small one only if/when it’s needed.
- To better capture the facial surfaces of the teeth, instruct your patient to open their mouth, but not so wide that the lips obstruct.
- Remember: you can flip the tip around to improve access.
- If a red light appears, simply roll the scanner handpiece slightly gingivally or occlusally, or move it more toward the area just scanned so it recognizes the anatomy. This might happen when scanning near objects that glare, such as retainer wires or gold restorations.
- If you continually receive a red light, you probably don’t have sufficient overlap; you should have about 30% overlap between scan captures.
- Don’t hesitate to use cheek retractors; simply ask the patient to hold them in place for you.
- For large holes, resist using the autofill feature and rescan the area, instead (i.e., as with ‘spell checkers’ in word processing, ‘autofill’ isn’t always 100% accurate).
- You can use the manual acquisition button even when the scanner is in auto acquisition mode.
- Be wary of TMJ patients having to stay open for extended periods of time. Offer a rest period.
- To easily capture the bite registration, move the tip downward to capture more of the lower teeth, but angle it toward the upper teeth so the scanner can recognize how the teeth occlude.

AFTER THE SCANNING…

- Review the scan in the software’s “Refinement” mode and look for residual holes, missing anatomy, etc.
- Use care to avoid dropping a tip or the wand; make sure the wand is secure when not in use. Avoid rolling over the wand’s cord with your chair.
- Use a Sharpie® marker to make a tally mark on a tip after each use to track its use. Tips can be sterilized approximately 20 times.
EXPORT THE SCAN FILES FROM YOUR SOFTWARE...

From your patient management software (Carestream’s ORTHOTRAC is shown below), export the scan files to a local folder. **NOTE:** A fictitious name is used below.
SPECIALTY APPLIANCES’ DIGITAL PORTAL – Once you export your digital files to a local folder and fill out your digital prescription sheet from Specialty Appliances, you can access Specialty’s Digital Portal to upload your case. At the time this Treatment Guide was produced, Specialty uses only models exported in STL format.

2. Click on the upload files button.
3. You are then redirected to the Specialty “Upload Digital Case” page to upload your files. Fill out and verify your email address, the doctor’s first and last name, the practice name, and the patient’s first initial and last name. Below the form you can select the files you wish to upload, which should be stored in a location that is easy for you to find. Note: if you do not complete the required fields, the uploader prompts you for the required information.

4. Once you have filled out the appropriate fields and selected the required files to submit, click the upload button. Once the files are uploaded, you receive a confirmation message that shows what files were uploaded, the time of the upload, as well as a confirmation number for the upload. There is an option for a printer-friendly version of this that allows you to print the confirmation for your patient files.
FREQUENTLY ASKED QUESTIONS...

1) **What kind of computer should I buy?** Carestream mates the CS3500 intraoral scanner with the optimal laptop for you. However, when using its plug-and-play feature on other computers you will achieve the best results if that computer is configured as if for “gaming.” To do that you simply need a fast processor and lots of memory – especially on the video end. The minimum and recommended system requirements are listed on the next page.

2) **Why does the light stay red?** The light turns red when the scanner can’t recognize the anatomy well enough to be able to “stitch it together” to the next capture.

3) **Are any holes acceptable?** Specialty does have the ability to repair minor holes missed in the initial scan; however, to ensure the fit of the appliance for your patient, please make sure your scan is as complete as possible. This also eliminates needing a possible re-scan of the patient later.

4) **Do I have to scan in any predetermined sequence?** Any sequence can be followed as long as captures overlap the previous one by 30%. Many users find it helpful to scan by quadrant. This takes advantage of the patient’s lip and mouth position, and the wand’s location; simply scan the occlusal surface first, and then either the facial or lingual.

5) **What types of files does the lab accept or need?** At this time, Specialty accepts STL files only.

6) **What type of base will be on the printed models?** The models will be printed as they appear in the digital file. Please specify on the Rx the type of base you prefer.

7) **Can you send my printed models to another lab to have an appliance fabricated?** Yes, Specialty Appliances can send your printed models to another lab. However, Specialty has 30+ years of experience fabricating orthodontic appliances and can fabricate any appliance needed, whether the case is submitted via digital scan or conventional impressions.

8) **How much does the CS3500 scanner cost?** The CS3500 can be purchased for $450/month for 5 years. Material-wise, the cost of intraoral scanning has been calculated to cost just 1/5th as much as making conventional impressions.
## COMPUTER CONFIGURATION FOR SCANNING...

<table>
<thead>
<tr>
<th>Item</th>
<th>Minimum System Requirement</th>
<th>Recommended System Requirement</th>
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| CPU                   | Laptop: Intel Core i7 2670QM, 2.2 GHz  
Desktop: Intel Quad CPU, 3.1GHz                                                      | Laptop: Intel Core i7 3630QM, 2.4 GHz  
Desktop: Intel Core i7 3770, 3.4G Hz                                                      |
| RAM                   | 4 GB RAM                                                                                  | 8 GB RAM                                                                                         |
| Monitor               | Standard CRT/LCD monitor with a minimum screen resolution of 1280 X 768                  | Standard CRT/LCD monitor with a minimum screen resolution of 1440 X 900                         |
| Operating system      | Windows 7 Professional (32 bit) for restoration acquisitions only. A 32-bit system may not have enough memory to support a full orthodontic acquisition.  
Windows 7 Professional (64 bit) required for orthodontic acquisitions.                 | Windows 7, 8, or 8.1 Professional (64 bit)                                                      |
| USB port              | USB 2.0 high speed port                                                                     | USB 2.0 high speed port                                                                           |
| CD/DVD drive          | DVD-ROM drive is required to install some software.                                         | DVD-ROM drive is required to install some software.                                              |
| Video card            | Laptop: Intel HD 4000 or similar  
Desktop: ATI HD 7750 / NVIDIA GeForce GT 550Ti or similar                              | Laptop: NVIDIA GeForce GTX 660M or similar  
Desktop: ATI HD 7850 / NVIDIA GeForce GT 560Ti or similar                                  |
| Video card driver     | Supports OpenGL version 1.4 and OpenCL version 1.1                                         | Supports OpenGL version 4.3 and OpenCL version 1.1                                               |
GLOSSARY...

**Autofill** – Optional process in which the CS3500 intraoral scanner extrapolates missing data and attempts to insert data automatically.

**Blue light** – The scanner is writing the data captured to the computer.

**CAD/CAM** – “Computer aided design”/“Computer aided manufacturing”... the basis for intraoral scanning-to-appliance manufacturing.

**Digital debonding** – Process by which the Specialty Appliances lab technicians digitally remove the braces from a scan in preparation for delivering of retainers, etc.

**Green light** – The scanner is ready and able to capture.

**GUARDIAN** – Specialty Appliances retainer replacement program. This generates income for the practice and provides a feeling of “insurance” to prohibit relapse for the patient.

**Intraoral scanning** – The process of using digital technology to create virtual three-dimensional models of a patient’s dental anatomy that can later be “printed.”

**Printed models** – Models made using 3-D printing from the scanner’s STL files that were submitted to the orthodontic laboratory electronically.

**Red light** – The scanner is not able to recognize the anatomy or the scanner is not stable enough to be able to make acquisition (in use). The scanner can’t capture yet (before use).

**Refinement** – The final process where the Carestream CS3500 software eliminates unnecessary acquisition of various anatomical features, or “flash.” It produces the final digital model that should be examined on screen when determining if all needed anatomy has been captured for the desired appliance.

**STL files** – Stereolithography is a file format native to the stereolithography CAD software originally created by 3D Systems. It is a general file format used in manufacturing. This file type is used for scanning applications in the dental and orthodontic industry.