

DECLARATION OF NATHANIEL E FRANK-WHITE

1. I am a Records Request Processor at the Internet Archive. I make this declaration of my own personal knowledge.
2. The Internet Archive is a website that provides access to a digital library of Internet sites and other cultural artifacts in digital form. Like a paper library, we provide free access to researchers, historians, scholars, and the general public. The Internet Archive has partnered with and receives support from various institutions, including the Library of Congress.
3. The Internet Archive has created a service known as the Wayback Machine. The Wayback Machine makes it possible to browse more than 450 billion pages stored in the Internet Archive's web archive. Visitors to the Wayback Machine can search archives by URL (i.e., a website address). If archived records for a URL are available, the visitor will be presented with a display of available dates. The visitor may select one of those dates, and begin browsing an archived version of the Web. Links on archived files in the Wayback Machine point to other archived files (whether HTML pages or other file types), if any are found for the URL indicated by a given link. For instance, the Wayback Machine is designed such that when a visitor clicks on a hyperlink on an archived page that points to another URL, the visitor will be served the archived file found for the hyperlink's URL with the closest available date to the initial file containing the hyperlink.
4. The archived data made viewable and browseable by the Wayback Machine is obtained by use of web archiving software that automatically stores copies of files available via the Internet, each file preserved as it existed at a particular point in time.
5. The Internet Archive assigns a URL on its site to the archived files in the format `http://web.archive.org/web/[Year in yyyy][Month in mm][Day in dd][Time code in hh:mm:ss]/[Archived URL]` aka an "extended URL". Thus, the extended URL `http://web.archive.org/web/19970126045828/http://www.archive.org/` would be the URL for the record of the Internet Archive home page HTML file (`http://www.archive.org/`) archived on January 26, 1997 at 4:58 a.m. and 28 seconds (1997/01/26 at 04:58:28). The date indicated by an extended URL applies to a preserved instance of a file for a given URL, but not necessarily to any other files linked therein. Thus, in the case of a page constituted by a primary HTML file and other separate files (e.g., files with images, audio, multimedia, design elements, or other embedded content) linked within that primary HTML file, the primary HTML file and the other files will each have their own respective extended URLs and may not have been archived on the same dates.
6. Attached hereto as Exhibit A are true and accurate copies of screenshots of the Internet Archive's records of the archived files for the URLs and the dates specified in the attached coversheet of each printout.

7. I declare under penalty of perjury that the foregoing is true and correct.

DATE: September 14, 2023

Nathaniel E Frank-White
Nathaniel E Frank-White

EXHIBIT A

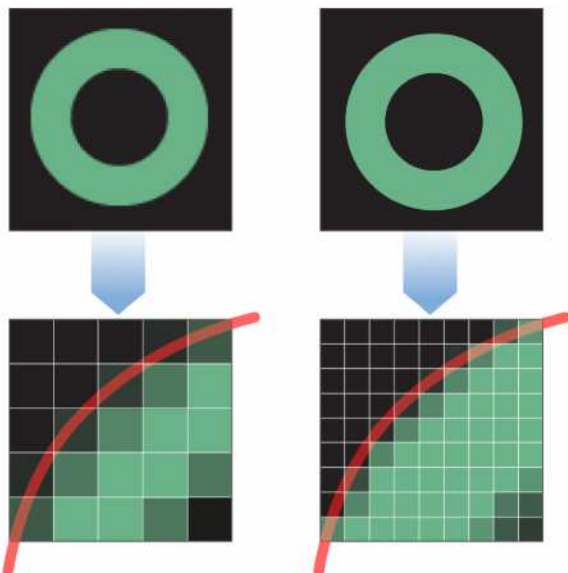
Request access to our exclusive Facebook Group.

THE ORTHO COSMOS

BLOG COURSES ABOUT MY ACCOUNT

Easily Calculating Resolution for 3D Printers

MAY 4, 2017 BY SCOTT FREY — [LEAVE A COMMENT](#)



3D Printer Resolution

One of the more confusing concepts within 3D printing is understanding the resolution of the printer itself. I had several conversations during the AAO on this subject with people so I think the topic is worth revisiting.

People often misquote Z axis resolutions as the printer's "resolution" because all additive manufacturing must occur in layers, and layer thickness is something that can be roughly compared between printers. In reality the Z resolution is only a very small part of the equation. The XY resolution actually has a far more significant impact on print quality and accuracy.

Perhaps the reason why XY resolution is rarely mentioned is that you can only make a direct comparisons between XY resolutions among pixel/projector based printing technologies like DLP-SLA, MSLA, and Polyjet. **You cannot really make a direct comparison between these technologies and Laser-SLA.**

With DLP, MSLA, Polyjet, and other "projector" based 3D printers, their XY resolution is defined mainly by the size of the pixels. If you want to understand the XY resolution of any of these types of printers, here is how:

- **DLP-SLA** -> Divide the length or width of the build platform by the number of pixels in the projector for that dimension (1920 x 1080p for an HD projector), then multiply by 25,400 to convert to microns. This will give you the pixel size in microns for either the X or Y dimension (pixels are rectangular). **For example, to achieve a 50micron XY resolution the build platform can only be the size of a 3x5 card with DLP printers.**
- **MSLA** -> This technology uses an LCD photomask to shape the UV light, so the pixel size is based on how the LCD photomask is manufactured and is constant. **You can simply ask the manufacturer what the pixel size is of their photomask to get the XY resolution.** One advantage of this technology is that you can have high XY

BECOME A MEMBER

Get access to our advanced orthodontic community, exclusive member content, and downloads— for free.

[JOIN NOW!](#)

SEARCH FORM

Search this website ...

SOCIAL ICONS



RECENT POSTS

Easily Calculating Resolution for 3D Printers
12 Months the New Target for Treatment Time
Are Passive Self-Ligating Braces Really Faster?
Orthodontics is Like a Circus
DIY Dental Monitoring Solution

resolution with a larger build area.

- **Polyjet** -> The printers using this technology list the DPI for their projectors, which makes conversion easy. **The Stratasys printer uses a 600dpi resolution in the XY, which is a 42micron XY resolution.**

Laser-SLA printers are a completely different animal than pixel based printers (I think the featured image for this post helps highlight that difference). *The XY resolution for these printers is actually determined by the pointing precision of the laser, which allows it to achieve a level of precision in the XY dimension that is finer than the laser spot size itself.* For example, the pointing precision of the custom galvos on the Form2 is less than 10microns.

Now that we have clarified 3D printer resolution a little further, this should help you filter out the noise a bit better. In the end though, the resolution specifications on these machines are only a glimpse into the potential accuracy of a printer, and they don't provide an adequate means of comparison for projector and laser-based 3D printers. **The information we really want is the dimensional accuracy of the objects being produced, which we will look at from prints in a few days.**

FILED UNDER: [3D PRINTING](#)

12 Months the New Target for Treatment Time

MAY 3, 2017 BY [SCOTT FREY](#) — [2 COMMENTS](#)



The New Normal

In the age of instant gratification, parents and patients (and doctors) expect orthodontic treatment to be far more efficient than the traditional 24mo estimates of generations past. **A recent survey conducted regarding their perceptions of orthodontic treatment found that the majority of patients (74% of adolescents and 59.2% of adults) felt that treatment should be completed 12 months or less.**

Table II. Characteristics of adult patients, adolescent patients, and parents participating in study				
Characteristic	Response	Adult patients (n = 50) (%)	Adolescent patients (n = 200) (%)	Parents (n = 200) (%)
How long do you wish orthodontic treatment to last?	<6 months	8 (16.3%)	80 (40.0%)	10 (5.0%)
	6-12 months	21 (42.0%)	65 (32.5%)	46 (23.0%)
	12-18 months	13 (26.0%)	41 (20.5%)	61 (30.5%)
	18-24 months	5 (10.0%)	7 (3.5%)	50 (25.0%)
	>24 months	2 (4.0%)	1 (0.5%)	11 (5.5%)
	Missing data	1	4	20

Uribe F, 2014.

Understanding patients' perceptions toward treatment is important because when treatment length is significantly out of step with their expectations this will have an impact on both case acceptance and patient compliance. Adolescents in particular had strong negative opinions in the survey about treatment going longer.

Our failure as a specialty to recognize this shift in expectations has left a vacuum now filled with gimmicks like 6month smiles and "Fast Braces" where patients are considering paying for inferior results simply to avoid a what they think will be a 24 month "sentence." **Shorter treatment times don't have mean cutting corners, and it is about time that we start communicating what we have to offer more effectively to the public.**

Given the advances in technology, patients' perceptions about how long

Given the advances in technology, patients' perceptions about how long treatment should take with decent compliance are actually pretty spot on.

My target treatment time for all patients, in Invisalign or braces, is now 12 months. This is 100% achievable with Invisalign or with precision passive self-ligating braces in combination with digital technology.

Here is a treatment summary from my last 10 removals from braces and Invisalign showing total visits, clinical minutes, and months in treatment. The Invisalign group exhibited a slightly greater degree of difficulty and had a greater proportion of adult patients, but for both groups the average treatment time was right around a year.



I don't really see many Class I mild crowding patients, so this wasn't a slouch sample. Below is a representative case from the sample of a patient treated with fixed appliances. The patient was a 13yo Female. Treatment was completed in 11mo, 3mo with Carriere Motion Appliance for unilateral class II, followed by 8mo in SLX brackets.



Here is a representative case from the sample of a patient treated with Invisalign. The patient was a 39yo Female. Treatment completed in 15mo, with weekly aligner changes.



I think it is time we start embracing 12 months as the new normal for treatment time for our patients. **Given the strains on motivation and the oral environment that occur with extended treatment times, delivering excellent results as efficiently as possible is the right thing to do for our patients.** The concern that I hear doctors voice about people on flexible financial contracts skipping town after treatment is a red herring and really isn't a reason not to do our best.

FILED UNDER: [BUSINESS, PATIENT INFORMATION](#)

Are Passive Self-Ligating Braces Really

Are Passive Self-Ligating Braces Really Faster?

MAY 2, 2017 BY [SCOTT FREY](#) — [LEAVE A COMMENT](#)



Maximizing the Working Properties of Orthodontic Archwires

Long before there was the Damon System, which brought the idea of self-ligating braces and faster treatment into the mainstream, George & Fred Schudy sought to maximize light forces and favorable wire properties during initial alignment¹. They realized that while the greater range and lighter forces offered by nickel titanium archwires provide significant treatment advantages, the wires alone were only a partial step forward toward increased efficiency. Their conclusion was that we must consider basic changes to the bracket systems themselves.

The Schudy article established 3 criteria that appliances must leverage to maximize the working properties of orthodontic wires:

- Increasing interbracket distance
- Small, flexible initial archwires
- As much intra-bracket play around initial wires as possible

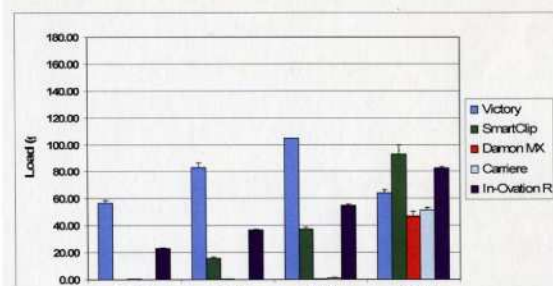
A bracket system that meets these requirements would maximize the expression of desirable wire characteristics and increase alignment efficiency.

Passive Self-Ligation Increases Treatment Speed?

The findings in this study that intrabacket space has nearly as much impact on the clinical workings of an orthodontic appliance as does interbracket distance is a particularly important discovery. However, despite acknowledging that intrabacket space also reduces friction between the bracket and the wire, making leveling faster and easier, they found it difficult to resolve the puzzle between increased intrabacket play and regaining control using traditional edgewise appliances¹. Their solution to this paradox at the time was a bimetric appliance utilizing single-wing brackets and differential slot sizing; however, passive self-ligating brackets now provide a particularly elegant solution to this dilemma.

The use of a passive self-ligating brackets rather than traditional elastic or steel ligation, allows doctors to leverage the benefits of maximal intrabacket space during initial alignment, while still being able to gain control during the final stages of treatment. The significance of this intrabacket space is illustrated in a study conducted at the University of Connecticut², where you can see that with a 1mm in-out discrepancy passive self-ligating brackets remain inactive until an .020 wire is placed.

Figure 28: Mean Deactivation Force with 1mm Cantilever Deflection



Holbert MB, 2008.

Naturally, the differences between the various bracket types become less apparent as these 1st order discrepancies are made more severe and as wire diameter increases, but the sweet spot for intrabacket space is simply wider for passive self-ligating braces.

On the flip side, you can have too much intrabacket space. Schudy's paper outlined their concerns about a failure to adequately fill the bracket slot late in treatment resulting in the expenditure of needless effort and time in the form of repeatedly removing arch wires to place "artistic bends." This has certainly been the case as of late with some passive self-ligating systems.

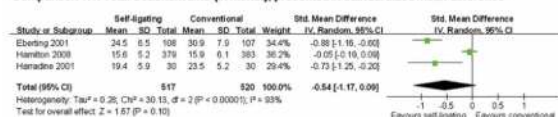
But Muh Meta Analysis

Well haven't systematic reviews and meta-analyses shown no difference with traditional braces? I'm glad you bring that up. These flippant references to systematic reviews or meta-analyses that people love to toss around are not an argument on their own. No one should put their faith completely in the reviewers to properly audit and analyze papers for them. Always double check their assumptions and methods to rule out the possibility of confirmation bias.

The major irony about the Chen article³ being so frequently cited to support the idea passive self-ligating brackets perform no differently than traditional braces is that it is actually an indictment against their own argument.

When we take the time to examine their analysis of the differences in total treatment time between self-ligating and traditional braces, we see that they identified three randomized control trials meeting their standards for inclusion in their review. Both the Eberting and the Harradine papers, show a clear reduction in total treatment time with self-ligating braces; however, the inclusion of the Hamilton paper nullifies this result.

Comparison 1.1. Total treatment time (in month), presented in standardized mean difference



Chen et al, 2010.

I tracked down all three of these papers to look at their methodology, and what I found in the Hamilton paper was puzzling. *Although they had a sufficient sample size, they were comparing active self-ligating brackets and single wing traditional braces instead of comparing passive self-ligating braces and traditional twins. Furthermore, the authors stated that "a number of" patients in both groups had Phase 1 treatment with a Herbst or Pendulum appliance, which certainly had an effect on total treatment time since both groups in the Hamilton paper had far shorter treatment times than either of the other papers. This is a big no no.* If you are going to pool data together for a statistical analysis, you can't combine apples and oranges. If the authors were doing their job, they would have excluded the Hamilton paper and their conclusions would show a clear advantage for passive self-ligating braces when it comes to treatment time.

Getting Down to Brass Tacks

Passive self-ligation certainly provides an elegant solution to the dilemma of intrabacket space, but it is not the only treatment approach that takes advantage of these principles. Simply put, we must apply the lessons of Schudy's paper, and adapt our fixed appliances and our biomechanics to increase treatment efficiency by striking a balance between efficient alignment and controlled finishing. The one thing orthodontists should not be doing is burying their head in the sand because patients are not looking to spend more time in braces or even any time in braces at all.

References:

- Schudy GF, Schudy FF. Intrabacket space and interbracket distance:

- critical factors in clinical orthodontics. *AJODO* 1989;96(4):281-94.
2. Holbert MB. First Order Archwire Deflections: Comparing Conventional, Active Self-Ligating and Passive Self-Ligating Mechanisms. *SoDM Masters Theses* 2008:171.
3. Chen SS-H, Greenlee GM, Kim J-E, Smith CL, Huang GJ. Systematic review of self-ligating brackets. *AJODO* 2010;137(6):726.e1-726.e18.

FILED UNDER: [BRACES](#), [PATIENT INFORMATION](#)

Orthodontics is Like a Circus

MAY 1, 2017 BY [SEAN HOLLIDAY](#) — [LEAVE A COMMENT](#)



Orthodontic practice can feel like a circus some days. A series of patients are late to their appointments, one of your clinical assistants called in sick, and your phones are off the hook calling in for emergency appointments. We have all been there, but the circus I'm really talking about is the circus industry. Specifically, about the changes to the circus business that led to [the closing of Ringling Bros. and Barnum & Bailey Circus](#).

At its prime, the Ringling Bros. and Barnum & Bailey Circus was a popular family outing. Over time, expenses grew, ticket prices did not, and concerns over the use of animal acts led to public concerns over the industry. This year, after 146 years of performances, this American icon has hung up its big tent.

"The competitor in many ways is time. It's a different model that we can't see how it works in today's world to justify and maintain an affordable ticket price. So you've got all these things working against it." Kenneth Feld – CEO



Todd Heisler/The New York Times

As market trends continue to change and other players enter into the orthodontic space, is the private practice of orthodontics headed in the path of the traditional circus?

Where most circuses were competing with each other over market share of a decreasing demand of traditional acts, a lack of change in the circus experience was leading to a downward spiral of the industry. By contrast, the circus has been reinvented and successfully invigorated by Cirque du Soleil. Their focus was on changing the experience: taking the popular and cost effective strategies of a circus act, and raising

the experience to the level of theater. This tapped into a client base that saw the circus act from Cirque du Soleil more as a Broadway show, than a sideshow act.

In less than twenty years since its creation, Cirque du Soleil achieved a level of revenues that took Ringling Bros. and Barnum & Bailey (the once global champions of the circus industry) more than one hundred years to attain.

What can we learn from Cirque's success?

The key factor in their success is differentiation. **Create an uncontested space where competition is irrelevant.** Cirque du Soleil has learned to generate and capture new demand. They also broke the value and cost trade off that plagues many business models. In many ways, we can still create great value to patients and decrease practice costs with the efficiencies patients expect.



Sergio Moraes/Reuters

"It's generally believed that the way to beat your rival is to outperform or outpace them. But in business, the better way to win is to create uncontested new market space where no competition exists...Cirque du Soleil designed the classic symbol of the circus with a glorious external finish and a higher level of comfort, making its tent reminiscent of the grand old circuses. Gone were the sawdust and hard benches. Acrobats and other thrilling acts retained, but their roles were reduced and made more elegant by the addition of artistic flair and intellectual wonder to the acts." – Mauborgne & Kim – [This is how Cirque du Soleil reinvented the circus](#)

We are at a crossroad, where we are moving from an industrial economy to a service economy. **Patient experience is king, and straight teeth and quality outcomes are no longer a differentiator, but the price of entry.** Through technology and economies of scale, delivering the product of straight teeth will reach a large scale where orthodontists can no longer compete by cost and sustain a viable business. **The key differentiator is delivering unparalleled patient experience by offering those aspects that are difficult to replicate by achieving an incredible office experience, unrivaled customer service, shorter treatment times, greater comfort, and better convenience.** Ultimately, take the best aspects of orthodontic treatment and reinvent the experience. Seems tough? If it was easy, everybody would be doing it... and that's the whole point.

Want to learn more about Cirque du Soleil's philosophy for success? Check out: [The Spark](#)

FILED UNDER: [BUSINESS, TRENDS](#)

DIY Dental Monitoring Solution

APRIL 29, 2017 BY [SCOTT FREY](#) — [LEAVE A COMMENT](#)





Teleorthodontics for Patients

The Dental Monitoring Software is based on the principle that because patients all carry their smartphones they can update you on their orthodontic progress at any time without having to take time off work or school to come to your office. **This is certainly true; however, smartphones already provide this capability without the need for additional software.**

There is certainly still value in the 3D monitoring service offered by Dental Monitoring, but you can implement a simple means of photographic patient monitoring today at almost no cost by scheduling FaceTime appointments or by simply having patients send you updates using the camera on their phone. **Today we are going to go step by step with how to build a simple remote monitoring system using Google Forms.**

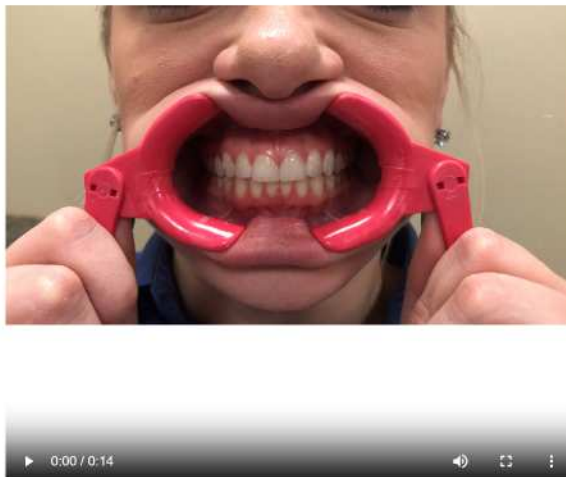
Implementing Remote Monitoring

Items Required:

- C-shaped cheek retractors (can be bought cheaply on Amazon)
- A GSuite account with Google Forms
- A designated treatment concierge to review submissions and contact patients
- Patients who own smartphones

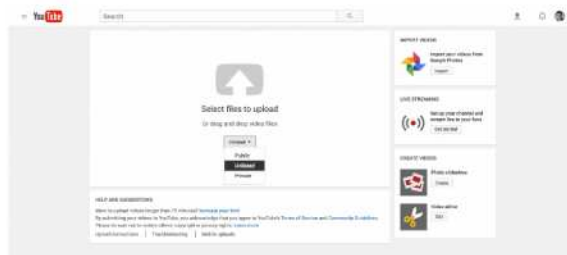
Step 1: Record Example Photo Monitoring Videos

Record with a team member some example videos that demonstrate exactly treatment progress information should be captured on a smartphone. You should record 3 example videos: one with teeth apart and aligners in, one biting down with aligners removed, and one teeth apart and aligners out. Videos work better than individual photos because data capture is continuous and the video can then be paused during viewing. To capture the videos, the patient can either hold the camera in front of a mirror or have a friend help, and they simply turn their head while keeping the camera still. It helps to keep traction on the cheek retractors with a free hand to visualize the side bite more effectively.



Step 2: Upload Example Videos to GSuite Youtube Account

Once you have your 3 example videos recorded, you will then upload them to your office GSuite account as 'unlisted' videos. Unlisted means that the videos do not show in search results and only people with the link are capable of viewing them. You will embed these uploaded videos into your Google Form.



Step 3: Create Google Form

Google forms within GSuite are HIPAA compliant and very easy to use so they are ideal for these purposes. They also allow users to upload files; however, this is limited just to people within the office network at the current time. When they change this feature, it will become even simpler to use for these purposes.

Start by filling in an appropriate title and description for the Photo Monitoring Google Form. In the settings require that an email address be entered and create a short answer section for the patient's full name. This will allow you to link the survey results with the videos sent from the patient.

Next create a linear scale question allowing the patient to self-assess their level of compliance.

Add a multiple choice question to gather information about the patient's progress (i.e. is this a routine progress update, did the bite correction with elastics get completed, is something broken or loose, etc.). You can also upload photos to accompany the choices to help guide the patient.

Next enter a text section with written instructions for the patient on how to capture the videos you require to perform remote monitoring of the patient. Below these instructions is where you will embed the videos that you previously uploaded, so your patients have an example of a good video capture.

Currently patients will still have to email you the videos (cannot upload directly to the form if they are not on your office network), so you will need to provide an email address and instructions on where to send the photos following form submission. Under settings you can have a confirmation message appear after submission with this information. I also like to add a message at the end of the form to remind them.

Link the form to a spreadsheet in GSuite and adjust your notifications settings so that your treatment concierge is notified about submissions and is able to contact the patients for follow up.

Once your form is complete you can use a short-link to share with patients

on remote monitoring via email or text.

Step 4: Set Up Recurring Emails When Needed

Once your Google Forms are complete you are ready to implement your remote monitoring program to help patients who are traveling, patients in retention, or simply want the convenience of telemedicine.

Setting up recurring emails within GSuite by installing any number of plugins from the Google Marketplace is simple and allows you to set it and forget it.

Remotely Monitoring Patients

This do-it-yourself teleorthodontics system is extremely useful for accommodating patients who might find it challenging to come to the office and certainly can make traditional orthodontic care more convenient for all patients. **In addition to the simple photo monitoring, I highly recommend that everyone add an appointment code in their practice management software to accommodate FaceTime appointments.** Facetime appointments work just like any other appliance check visit, but are simply done using a computer or smartphone in a private area to video conference with the patient.

Once you are up and running with these new appointment codes and systems, the following situations are ideal for offering more convenient options for your patients:

- Better communication regarding loose/broken appliances, wire pokes, and other patient concerns so that your team can schedule repair appointments more effectively
- Reduced appointments when using appliances that do not require doctor activation (Invisalign, elastic bite correction, jack screw expanders, habit appliances, etc.)
- Improved monitoring during retention
- Better coordination of care for patients who travel a distance or have challenging schedules

If you happen to be patient reading this article, know that orthodontists are generally a very forward thinking and flexible bunch so even if your doctor hasn't presented this as an option, I am sure they would be more than happy to accommodate you. Hope you all found this post helpful!

FILED UNDER: [LIFEHACKS](#), [PATIENT INFORMATION](#), [TRENDS](#)

Technology Can Be A Catalyst To Grow Your Practice

APRIL 28, 2017 BY [SEAN HOLLIDAY](#) — [LEAVE A COMMENT](#)



By definition, a catalyst is a substance added to another substance, to accelerate the rate of a reaction. The catalyst is not consumed in this process and may be used many times before it loses its effectiveness. **The issue with a catalyst, is that it does not cause a reaction by itself.**

Consider practice growth as the result of a reaction. **Technology is a catalyst that will not lead to a result unless a base reaction is present.** Simply using scanners, 3D printers, cone beam, or Invisalign will not guarantee success. Toys are just that, unless they add value to patients, and lead to return on investment to the practice.

By itself, technology will not grow your practice. There are many toys and applications to choose from these days. In most circumstances, there is a sales team that will show you how that new device, application, appliance, or equipment will lead to practice growth. There are key things that must be in place to maximize the benefit of a technology add.

The base reaction to practice growth is the right type of practice culture. Your team culture, outstanding service, and the right practice model for your demographics are key steps that need to be in place to facilitate growth. **Once the base reaction is in action, it is important to have processes that are congruent with technology.**

If you integrate a piece of technology in your practice, consider ways to enhance how the technology adds value to patients and make that message a standard script in your office.

- Have a **team culture** that promotes the benefits of technology.
- Use technology to **improve the patient experience.**
- Highlight **your team's special experience** with the technology.
- Emphasize how **your skills with the technology** benefited the patient's treatment.

For many of us, we invest in technology to improve our practices. It becomes more important what you do with that technology, than simply buying it. **The key to grow is taking that digital tool and use it to enhance what already makes your practice unique.**

FILED UNDER: [BUSINESS, TRENDS](#)

Section 199 Manufacturing Deductions for Orthodontists

APRIL 27, 2017 BY [BRAD KUCHARO](#) — [LEAVE A COMMENT](#)



Understanding Section 199 Deductions

The Section 199 deduction, commonly referred to as the Domestic Manufacturing Deduction, was added to the tax code by congress in 2004 with the goal of stimulating U.S. manufacturing. Although it is not common knowledge, orthodontists routinely engage in numerous activities that would qualify for this tax break, such as operating in-house labs to produce retainers, study models, appliances, etc. Therefore, it is important for business owners to understand what types of production activities qualify for this deduction and how to claim it correctly during tax season. This will give you a much better appreciation for the true value of any investments you make in new technology for your patients.

The rest of this post is available only to orthodontists and orthodontic residents registered with the Ortho Cosmos

Log in to the Ortho Cosmos

Username

Password

☐ Remember Me

LOG IN

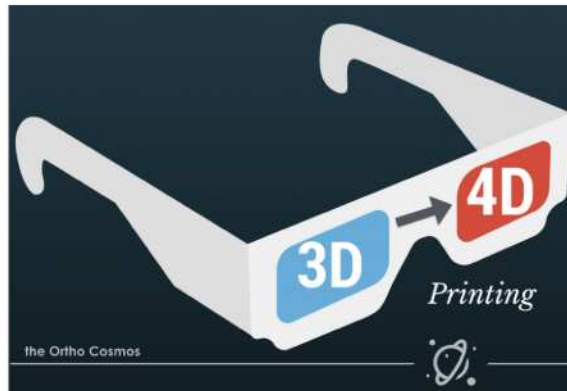
Not registered yet?

[Click here](#) to sign up for your Free Ortho Cosmos Membership

FILED UNDER: [3D PRINTING](#), [BUSINESS](#)

The Future in Orthodontics is not 3D, it's 4D

APRIL 26, 2017 BY [SEAN HOLLIDAY](#)



Orthodontic treatment continues to evolve. **Our digital future means additional diagnostic tools and treatment modalities that augment and expand the application of our specialty.** The application of 3D printing into orthodontics was introduced by the Invisalign product. By using 3D printing technology which was developed by Charles Hull in 1983, and sold by 3D Systems, Align Technology added a niche into the orthodontic market.

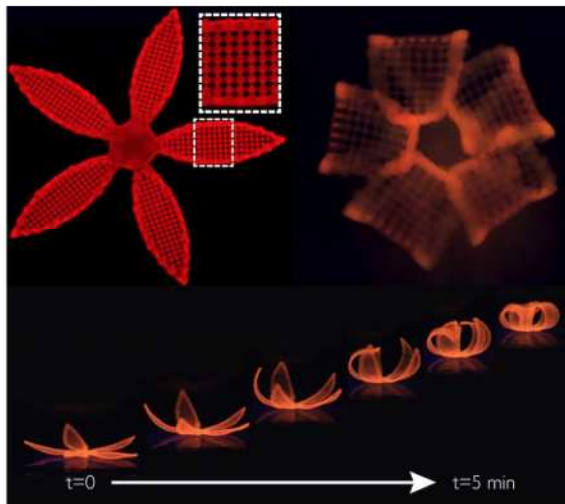
The current technology in 3D printing has been evolving in manufacturing functional parts and expanding the applicability of this process. **As patents have expired in the 3D printing processes, we are seeing the commoditization of 3D printing.** This is one of the reasons why this process has become so popular. The next evolution in the process has been in the expanded consumer access to lower cost solutions to enter the space. What was once only available to large manufacturing corporations and commercial laboratories, can now be owned and operated by orthodontic practices, schools and even the average consumer.

The challenge with 3D printing, is that it is a static process. In the dental industry, this digital process facilitates static restorations and provides an opportunity to improve the efficiency of laboratory workflows. When it comes to orthodontic treatment, our treatment is dynamic. 3D printing serves an immediate benefit for growing study models for traditional lab fabrication. This benefits offices in removing the alginate or PVS impressions, but leaves the untapped potential of the digital tools. When making a series of aligners, movement can be staged and adjusted in

sequence to turn a static model into a series of models with a progression of movements. **In order to change a static process into a dynamic appliance, the future for orthodontics is in 4D printing.**

4D printing is a digital process that takes 3D printing materials and adds the 4th dimension of time. This is accomplished by adding movement into the 3D printed parts and manufacturing appliances that change in shape over time. The stimulus for such movement is a change in temperature, a charge or kinetic process that alters the shape of the 3D printed object. Think of it as adding a Niti wire to move a tooth vs. a series of wires with progressive bends to achieve the desired tooth position. **When you think of it in that dynamic, you can realize that in the same way Nitinol wires revolutionized bracket systems, 4D printing can revolutionize the future of digital orthodontic treatment.** Whether they are fixed or removable, 4D printed appliances would improve the efficiency of treatment and utilize digital workflows to incorporate many of the imaging and diagnostic tools we have available today.

Think that 4D printing is science fiction? [Take a look](#) at some of the projects today developing the science of 4D printing and [shapeshifting architecture](#).



When investing in those new 3D printers, **be cautious of making large capital investments in a fluid and highly evolving industry.** Material science and new methods will continue to change the way we practice and get me excited to think of what the future holds.

FILED UNDER: [3D PRINTING](#), [TRENDS](#)

What to Look for at the AAO 2017

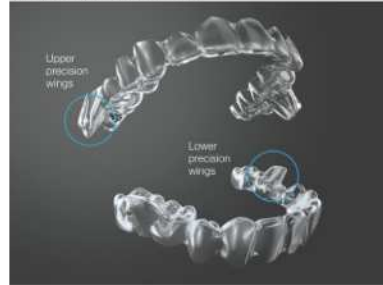
APRIL 21, 2017 BY [SCOTT FREY](#)



With the AAO kicking off today, we thought it would be worthwhile to give a quick run down of some of the things that caught our eye at the annual session this year. We don't have any formal posts planned over the weekend, but I'll be checking in throughout the session on Facebook to share interesting finds and updates. Hope to see you there!

New Products

- **Invisalign's Mandibular Forward Advancement** (pending US release) – There will be a heavy Teen focus at the Invisalign booth this year, and for those of us looking forward to their functional aligner appliance there will definitely be additional information to prepare you for when it gets to the US.



- **Henry Schein's New Color Class II Motion Appliances** – The 'Colors in Motion' are very cool and will be a lot fun for patients.



- **EasyRx** – For those of you not familiar with this product, it is a really nice in-house service for coordinating 3D printing within your practice, and worth a look. They are rolling out the ability to do some processing of the models from within the Rx form so you will be able to in a few clicks add a base, hollow out the .stl files, label them, and queue them for printing at any location right from the cloud (no noodling around with MeshMixer).



- **The Wireless Trios** – Probably going to cost waaaaay too much, but will still be cool to look at.



- **Various 3D Printers & Software across the exhibit hall.** Make sure you check [our series of posts on 3D printing](#) so you don't overpay and find the right machine for your practice needs.

In the Lecture Halls

- Saturday 9-10AM: **LeeAnn Peniche – BYOB: Be Your Own Brand**
 - I have never used LeeAnn, but I have heard great things. Will be worth getting up early for.
- Saturday 10:15AM: **Hugo De Clerck – Rotations of the Maxilla and the Occlusal Plane: The Key to Successful Orthopedics**
 - Will have some great information on what actual orthopedic effects on the maxilla look like, since most people are only familiar with protraction dogma.
- Saturday 2:15AM: **Rebecca Bockow – Goal Oriented Treatment Planning with Corticotomy Facilitated Orthodontics**
 - Not familiar with this speaker, but will try to swing by to check out

the content. We should always be looking to modify gingival phenotype to reach our treatment goals rather than treating to the pathology.

- Saturday 3:00AM: **Antonino Secchi – Leveling the Occlusal Plane to Solve Vertical Problems**
 - I saw Antonio's topic and now I know why he was so impressed by my Invisalign lecture that he attended last year. Great guy!
- Sunday 9:15 – 10:15AM: **Maria Bailey – Millennial Moms: 202 Facts Marketers Need to Know**
 - Unless you actually happen to be a millennial like myself, this should be a great talk to catch to help guide your understanding of how to connect with this generation of parents/patients.
- Sunday 10:30 – 11:30AM: **Chris Bentson – State of the Orthodontic Industry**
 - Chris always has solid information.
- Sunday 3:00PM: **Mani Alikhani – Vibration and Perforation: What Do They Have in Common?**
 - Vibratory stimuli are much harder to direct, but still a useful tool for bio-stimulation. If you are prescribing these types of interventions, it is good to examine the physiology behind them to better guide your judgement.
- Monday 10:15AM: **Branislav Vidovic – The Influence of Orthodontic Treatment on Facial Balance**
 - This talk sounds like it might cover some similar concepts that I cover in my Soft Tissue Orthodontics courses so might be interesting to check out.
- Monday 10:45AM: **Chris Chang – Three Major Applications of Extra-radicular Screws**
 - Chris has a very interesting practice and I always enjoy seeing him present.
- Tuesday 9:00AM: **Seung-Hak Baek – Surgery-First Approach for Skeletal Class III Patients**
 - Even if you do very few surgical cases, everyone needs familiarize themselves with surgery first approaches. Much better for insurance approval, speed of treatment, and patient acceptance.
- Tuesday 10:25AM: **Jianyong Wu – Treatment and Post-Treatment Effects of a New Magnetic Palatal Expansion Appliance**
 - If you are still hanging around on Tuesday, you might poke your head in and see what the appliance looks like. We definitely need a better range of options for expansion with more precise (and lighter) force levels that we can prescribe.

FILED UNDER: [NEWS](#)

The Art of the Presentation

APRIL 20, 2017 BY [SEAN HOLLIDAY](#)



There is a lot of anticipation of all the great information available at the AAO meeting. Vendors will be launching their new thing, and a select group of presenters will rise above the fear of public speaking and put their information for all to view and critique. Being there myself, I can attest it takes many of hours of preparation to put a presentation together. **Going public on a topic of interest, and speaking in front of a room of your peers takes a whole other skill and a lot of courage.**

“ Facility with public speaking is not a gift granted at birth to a lucky few. It’s a broad-ranging set of skills” – Chris Anderson, Author, TED Talks

Presentations are both an art and a science. At the risk of sounding like a presentation snob, have you thought about the things that make presentations memorable? The design, the delivery, and the subject are all critical. **A presentation appeals to a classic form of human communication: Storytelling.**

When you are sitting in the lecture hall listening to that next presentation. Think about the special tools that presenter put together to keep you entertained, and consider what made the lecture drive you to take action on what you learned.

The Passion

Charismatic speakers don’t just happen. The charisma that they instill into their presentation is often a result of the passion they hold for the subject matter they are presenting. **It is often palpable when a presenter is passionate about the message they are delivering to the audience.**

Passion can surpass experience, since the audience can accept nervousness from the delivery for the fact that the presenter’s message is delivered with compelling emotion.

The Length

My grandfather once approached his preacher after Sunday service and let him know he appreciated the sermon, “but”, he said, “you did not talk about, what I wanted you to talk about.” The preacher looked puzzled, and asked my grandfather: “What did you want me to talk about?” “About ten minutes”, answered my grandfather. So what is the right length of a presentation? That depends on the subject matter, but if you take the TED stage as a consideration, they have limited presentations to 18 minutes. Some presentations are well suited for sixty minutes, but longer becomes more perilous. **Shorter presentations can be more challenging that longer rambles since it forces the presenter to distill the most critical information down to the maximum impact for most people to absorb that information.**

The Slides

Ever wonder how much text should be on a slide? Most presentation coaches will recommend the less writing, the better. Some presenters use the slides as a crutch to deliver the message which could be better received as a memo or a handout. Text on slides distracts from the verbal message, and bores the audience. **Part of the art of presentation is putting great slides together that support the speaker’s words, instead of replacing them.** The visual appeal of a presentation is a key component of the slides being a visual aid vs. a report on data.

“ Communication is about getting others to adopt your point of view, to help them understand why you’re excited (or sad, or optimistic, or whatever else you are). If all you want to do is create a file of facts and figures, then cancel the meeting and send in a report” – Seth Godin, Author, Really Bad Powerpoint

These are a few areas that presentation gurus highlight as critical to an effective presentation. Next time you sit in the lecture hall, focus on not only the message from the speaker, but take a look at the skills they have set on display for delivering a message in front of all those attentive eyes and ears in the audience. You may notice that the most memorable lectures from this upcoming meeting truly deliver on the art form of storytelling.

FILED UNDER: [TRENDS](#)

OUR PROMISE

We are committed to fully transparent and free discussion in the interests of the specialty and our patients.

[MORE ...](#)

RECENT POSTS

[Easily Calculating Resolution for 3D Printers](#)

[12 Months the New Target for Treatment Time](#)

[Are Passive Self-Ligating Braces Really Faster?](#)

[Orthodontics is Like a Circus](#)

[DIY Dental Monitoring Solution](#)

SEARCH THE COSMOS

[HOME](#) [ABOUT](#) [BLOG](#) [LIBRARY](#) [CONTACT US](#)

© The Ortho Cosmos