A Clear Approach to Clear Aligner Therapy

The Esthetic Revolution has Begun…
Is Your Practice Ready?

Neil M. Warshawsky D.D.S., M.S., P.C.
Diplomate, American Board of Orthodontics
Associate Professor of Orthodontics, University of Illinois Craniofacial center

Today we will not Monkey Around…we are here to Learn!

Today is split up into 2 parts

- Morning is a clinical review of the CORE 5 moves associated with Essix Retainers
- Afternoon is a hands on lab session where we discuss appliance design, Thermoforming equipment, Different appliances commercially available, as well as different types of Plastic and their uses.
- We conclude by fabricating a real exercise to align a patients case, as well as learn to manage and control diastemas.

Neil M. Warshawsky D.D.S., M.S., P.C.

•Trained at University of Illinois graduating in 1986, 1988,1990, 1991, &1992
•Started Get It Straight Orthodontics 1992
•Joined university of Chicago Craniofacial Team 1994-2006
•Moved into our main office 1995
•First Essix® Plastic retainer made in 1996
•First Invisalign™ case in 1999
•4 locations in/around Chicago, Illinois
•Associate professor of Orthodontics University of Illinois Health Center Craniofacial team 2012
•Today we have treated over 1000 Invisalign™ aligner cases with approximately 2000+ Essix® Plastic appliances delivered

Invisalign™ is not a trademark of DENTSPLY.

Neil M. Warshawsky D.D.S., M.S., P.C.

- I am a paid Advocate to speak Professionally on certain topics:
  - Advocate Speaker for 3M Unitek (Incognito Lingual Appliances)
  - American Orthodontics (Vision Passive Self Ligation brackets)
  - Most importantly and why we are here…DENTSPLY Raintree Essix Glenroe regarding the MTM® Minor Tooth Movement system using the Hilliard Thermoplier® Pliers System

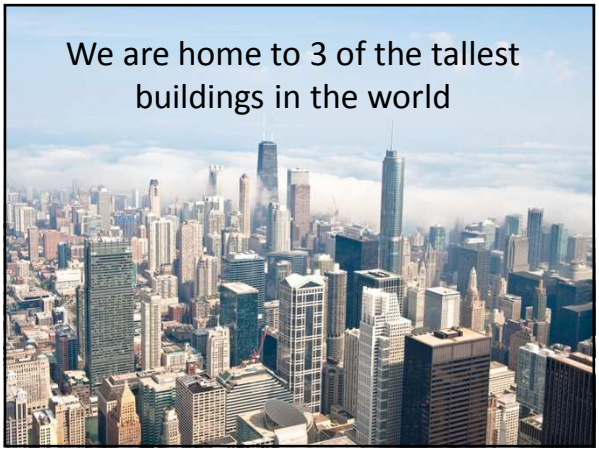
3M Unitek, Invisalign™, American Orthodontics and Vision are not trademarks of DENTSPLY.

I come from the Chicago where we have had a Bear of a winter

Our Weather can be Fierce!
(So can our hockey team…)

But when it is not snowing our Iconic Skyline is a site to be seen

We are home to 3 of the tallest buildings in the world



Although you may not know our city's history…

You may know some of people, places, or things that started in Chicago

Two of my Neighbors….

Chicago is Known as the Birthplace for Modern Dentistry and home to the American Dental Association

G.V. Black was the Dean of the first Dental school at Northwestern University.

Some of you may know our food…

As the Golden Arches represents fast food world wide….

The MTM® trademark is going to represent an affordable way to straighten teeth using Aligners.

mtm minor tooth movement

Today we will learn about an in-office removable technique to align teeth

- MTM® Clear•Aligner In-Office System to create aligners and retainers from Essix® Plastic to enact and maintain Minor Tooth Movement™.
- You build and activate the aligners one at a time as you deem necessary.

mtm minor tooth movement

Why Learn the
MTM® Clear•Aligner In- Office System?

- Anyone can learn to master its principles relatively quickly
- Your patients will accept this technique as it is cost effective but an "Esthetic solution"
- Once the tools to make these are paid for, the cost of materials to build an aligner is under $10.00. What you can charge for it routinely can be greater than 100 times!

This is an Essix® Plastic Retainer

What does Essix® Plastic Brand stand for?

- Sheridan's System
- Esthetic
- Simple
- Stabilize
- Social
- Six (typically) teeth

Overview of our discussion

- Essix® Plastic Retainers vs. Hawley
- Making a good impression
- Making/trimming an aligner
- Minor Tooth Movement™ (MTM® System)-- what you can correct
- Tools required to do the job
- 5 ways (at least) to create an Essix® Plastic retainer

Hawley vs Essix® Plastic Retainer

3-5 days
Turn-Around Time
$35.00
Lab Costs*º

60 minutes
Turn-Around Time
Approx. $1.00
Materials Cost*

*Excludes impression material cost. ºData on File

Down sides to cold cure acrylic

- Porous therefore it smells with time
- Hard to work with
- Thickness of the acrylic is not consistent
- Takes a while to make an appliance
- Person working with the acrylic needs a lot of experience to produce consistent appliances
- Acrylic must be pressure cooked in order to get greatest strength and least bubbles
- Some individuals are allergic to cold cure acrylic

Downsides to an Essix® Plastic appliance

- Retainers do not last as long as a Hawley retainer
  - Easy to throw away
  - They do not allow the occlusion to settle
- Must be removed to eat
- Aligners limited in how much movement can be accomplished…or are they? Later today we will revisit this point.

What Special Equipment is Required to Make Essix® Plastic Appliances?

- Vacuum Former
- Ministar®
- Biostar®
- Drufomat Scan

Ministar, Biostar and Drufomat are not trademarks of DENTSPLY.

Thermoforming Equipment

- Vacuum machines
  - Usually accept 5” squares
  - Need electric outlet only
  - No compressor connection needed
  - Cannot laminate multiple layers of material together

Pressure Thermoforming Equipment- Positive Pressure

- BioStar / MiniStar
  - Positive Pressure Machines
  - Automated preset times are available for variable materials
  - Non-vertical design
  - 4.5/6 bars 60/90 psi pressure

- Drufomat from Dreve
  - Vertical Operation
  - Automated time set
  - Small footprint
  - 5-yr warranty
  - 6 bars/ 87 psi pressure

Are ***ALL*** clear aligners the same?

Today's Clear Aligner Brands

Three Ways of Moving Teeth

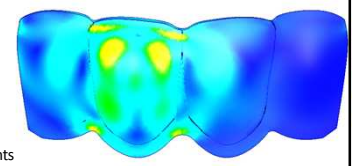
1. Broad Surface Pressure
2. Mechanical Attachments
3. Integrated Points-of-Force

1. Broad Surface Pressure

Invisalign, Clear Correct, Others

- Broad engagement of the aligner against tooth surface used to accomplish movements
- Across multiple/adjacent teeth, it can deform the plastic compromising the aligner's margin adaptation and engagement.
- Limited in its ability to treat all six orthodontic movements

Stress/Deformation Analysis



2. Mechanical Attachments

Invisalign, Clear Correct, Others

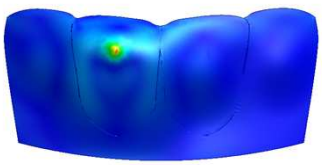
- Bonded attachments act as fixed force vectors to enable broader ranges of movements.
- Bulky attachments can stretch plastic and diminish ability to accomplish movement
- Insertion/removal can be both difficult and uncomfortable for the patient and esthetically challenging.
- Esthetically sub-optimal

3. Integrated "Points-of-Force"

MTM® Clear Aligner

- Force points provide direct and targeted engagement of the aligner to individual teeth
- Significant reduction in deformation across adjacent teeth allows for improved margin adaptation during treatment
- Meets biomechanical requirements for virtually all orthodontic movements
- Little/no need for attachments

Stress/Deformation Analysis



MTM® Service Center

A Unique Approach to Moving Teeth

Fully-Integrated Force Points

+

"Open Pathway" Aligner Architecture

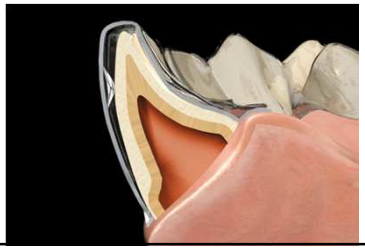
+

Enhanced Clarity

How the MTM® System Work?

It utilizes Integrated Force Points to Move Teeth

- Aligners move teeth with specific points of force
- Activations are up to .5mm movement / aligner / tooth
- Cases typically involve a series of 3-10 activations using a total of 1-4 aligners to complete their task



The MTM® System relies on

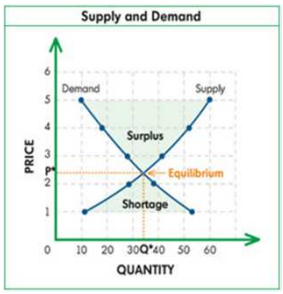
"Open Pathway" Architecture

- MTM®'s unique open-pathway architecture incorporates both "before-and-after" space, which helps facilitate tooth movement within the aligner
- More natural unraveling of teeth
- Collisions between teeth are less likely to occur as movement continues within the available space

The Esthetic Orthodontic Market is *GROWING* nicely due to Invisalign and all of their marketing.

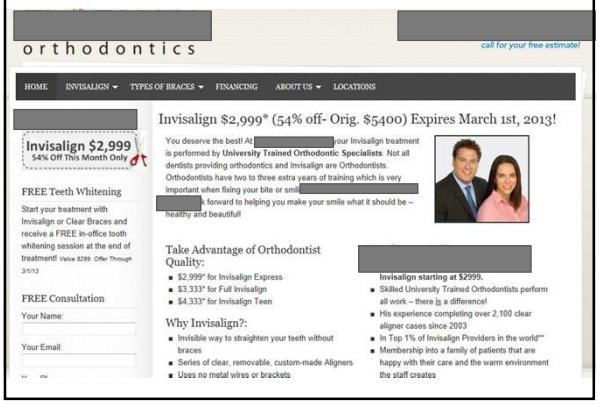
Certified Invisalign Providers:

- Today Orthodontists represent the minority of all Certified providers
- Competition is fierce among dental providers
- Due to the fact that it is easy to be certified as a user, the supply of doctors has driven the cost of Invisalign down.



As a result of the volume of users it is becoming more and more difficult to achieve a profit with the Invisalign System.

Volume Discounting make the product look cheap



Economic Forces are driving the following:

- Many competing systems attempt to imitate Invisalign
- Invisalign is becoming more aggressive and treating out cases that would be better served in fixed hardware
- Doctors are frequently attempting cases that are inappropriate for aligner care
- Failed aligner cases are starting to give the public the idea that clear aligner therapy does not work well

News Flash

Invisalign is in the business of making aligners that DO NOT FIT! What happens when they are successful?

DO NOT PASS GO!

In reality it is called *REFINEMENT*

In Essence you take new impressions and START OVER! More Time, more money, less profit!!!

What is MTM® In-Office?

- Based on a technique developed by orthodontist Dr. Keith Hilliard to address increased patient demand for esthetic treatment
- Widely published and practiced for over 10 years
- Uses basic orthodontic principles to achieve minor tooth movements that cost-effectively improve the patient's smile
- Utilizes the Hilliard Thermoplier® Pliers in combination with Essix® Plastics to fabricate clear aligners that move teeth with integrated "force points"
- Maximum 1mm of movement per tooth per month

Usually requires space within the arch for teeth to move into.

Is often a cosmetic procedure.

MTM® Clear Aligner System

Unlike most of the Commercial Clear Aligner Systems available today, the MTM® Clear Aligner System requires no fancy computer to operate. In fact from the time you meet your patient to the time you deliver your first aligner may be just a FEW SHORT HOURS!

The MTM System is an in-office removable technique to align teeth

By involving your staff you will start your road to economic success

mtm
minor tooth movement

Types of tooth movement possible using plastic

- Bodily/Lateral movement
- Rotation
- Tipping
- Torquing
- Space closure (diastemas/extraction space)
- Crossbite correction

MTM® Concept is simple:

Space + Force + Time = Tooth Movement

(Sheridan's First Law of Biomechanics)

First: Space needs to be made between the teeth.
Options for Creating Space within the Arch:


Burs


Abrasive Strips


Abrasive Discs

MTM® Concept is simple:

Space + Force + Time = Tooth Movement

(Sheridan's First Law of Biomechanics)

Second: space needs to be designed within the appliance to allow for tooth movement
Options for Creating Space within the Aligner


Window


Blockout


Thermoplier® Pliers

MTM® Concept is simple:

Space + Force + Time = Tooth Movement

(Sheridan's First Law of Biomechanics)

Ways of creating force on teeth

- Hilliard Thermoplier® Pliers (We will concentrate on this)
- Positioner effect of resetting teeth
- Divot/shave the model
- Mounding
- H.I.T.® System
- Embedding finger springs and power components in the aligner

MTM® Concept is simple:

Space + Force + Time = Tooth Movement

(Sheridan's First Law of Biomechanics)

Creating Force on the Target Tooth will cause tooth movement

Thermoplier® Pliers create force points and protrusions that apply force to the target tooth in the direction of desired movement

MTM® Concept is simple:

Space + Force + Time = Tooth Movement

(Sheridan's First Law of Biomechanics)

Time required between each visit for SAFE tooth movement

3-4 Weeks per Interval
Visits last less than 5 minutes

Expected treatment time start to finish varies by case

Candidates for MTM® System

- Patient's primary concern is esthetics
- No TMJ symptoms
- No periodontal concerns
- Adequate space for movement
- Second molars present
- Motivated patient!

MTM® System is my choice for treating mild relapse

- Mild crowding up to 3 millimeters
- Rotations
- Blocked out teeth
- Spaces

Not Acceptable-Case Criteria for MTM® In-Office

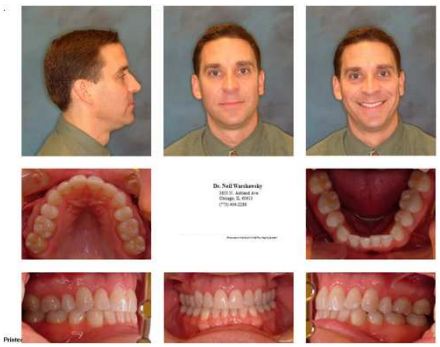
- Existing excessively swollen and inflamed interproximal tissue
- Severe pretreatment incisor rotations (Use Essix® Plastic appliances as secondary retention)
- Severe procumbency of the incisors
- Poor patient compliance expected

Clinical Applications

Hint: This is what you came to learn…

In comes your 9:00 AM patient

Mild crowding



TX plan

- One upper and one lower Essix® Plastic retainer utilizing the Thermoplier® Pliers method to align the teeth
- Visits were on a 3-4 week recurrence
- 5 visits were needed including the consultation and impression

5 visits later….

NOT BAD for Less than 20 minutes of chair time!

Patient was pleased

Question: What do you charge for this case?

Let's do the math

- Materials: Alginate, Stone, 2 sheets of Essix ACE® Plastic, Separator for the models, 1 Scotch-Brite™ disc, 1 retainer case with my name on it, 1 sample of Retainer Brite®, 1 sheet of instructions of how to care for the appliance (Approx. $10)
- 1 hour of my assistant to take impression and pour the model (Approx. $11)
- 20 minutes of the junior lab technician's time (Approx. $8)
- Use of the Drufomat Scan (Free -- it is paid for)
- Miscellaneous office staff time 1 hour (Approx. $35)

ScotchBrite® and Drufomat are not trademarks of DENTSPLY.

Fee $1000

- Profit was $936 for an honest 20 minutes of your time
- If you opt for a bonded retainer to hold the lower or upper arch add an additional $200 per arch
- This can equate to approximately $2800 per hour of earned income! Not bad!!!

What do you want to earn?

- Crown and Bridge average of $365.00 per hour
- Bleaching System average $171.66 per hour
- MTM® In-Office system $2800.00 per hour

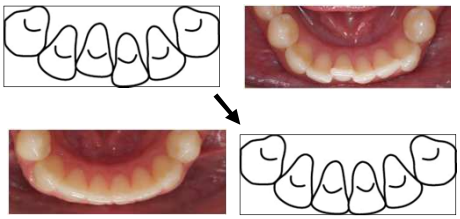
NO Question I know what I want to do…

Classic Essix® Plastic Case

4 Visits later

Overbite and Midline both improved

MTM® System Mechanics



Remember Sheridan's first law
FORCE + SPACE +TIME = TOOTH MOVEMENT

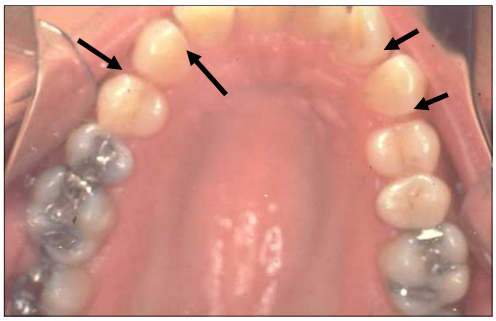
You must plan to make space within the dental arch

- Interproximal reduction (IPR)
- Expansion
- Flairing of the teeth
- Distalize teeth
- Extraction

IPR and ARS

- IPR – Interproximal reduction
  - Removal of enamel between the contacts of the teeth (done by hand)
- ARS – Air-Rotor Stripping
  - The use of a handpiece (air-rotors) to remove enamel from teeth
  - Applies to any handpiece – air-driven or electric

Air-Rotor Stripping



Creates space for movement

Photo courtesy Jack Sheridan, DDS

Rationale for IPR and ARS

- Enamel abrasion is a natural process
- Decreased interproximal distance actually reduces intrabony pockets
- No caries increase due to ARS
- Potential for remineralization when inert, fully reacted enamel is reduced
- Reduces need for extractions and need to "fill" extraction spaces

ARS in Patient Terms

- Avoid:
  - Stripping
  - Cutting
  - Removing
- Use:
  - Contouring
  - Slenderizing
  - Enamelplasty
  - Cosmetic tooth reshaping

ARS Space Considerations

- Typical MTM® System case requires under 3 mm of ARS. In my experience Invisalign® and Orthoclear can approach almost 5 mm.
- Lower incisor enamel available is often < 2 mm
- Over 2 mm of reduction may require some posterior tooth reduction to achieve space
- Maximum arch ARS is 8 mm (Not recommended for MTM® System)

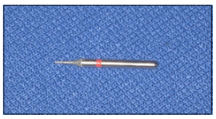
ARS Considerations

- Teeth should be shaped not just trimmed!
- Never use bur to cut across facial to lingual (all burs have taper)
- In upper anterior, ARS contralateral teeth to obtain better esthetics
- Use Remin gel or fluoride gel after ARS to help remineralize tooth
- A maximum of 0.5 mm per tooth surface should be removed. I Recommend only doing up to 0.2 mmTeeth should be shaped not just trimmed!
- Never use bur to cut across facial to lingual (all burs have taper)
- In upper anterior, ARS contralateral teeth to obtain better esthetics
- Remineralize after ARS to help restore enamel
- A maximum of 0.5 mm per tooth surface should be removed. I Recommend only doing up to 0.2 mm

Methods to Remove Enamel for ARS

- Abrasive flexview strips
- Burs using a high speed drill
- Diamond Discs for slow speed drill
- Diamond coated quick strips
- Diamond embedded spacefiles with or without the IDEAL reciprocating handpiece

Burs for Enamel Removal



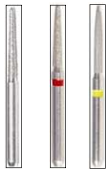
5500 bur is used to remove enamel on smaller anterior teeth

Bur is placed gingival to contact and moved incisally /occlusally

Burs for Enamel Removal

699LC bur is used to remove enamel on posterior teeth

Finishing burs are used to get the smoothest finish possible



Measurement of IPR/ARS

Remove at most 1.0 mm of enamel per contact. This represents a max of 0.5 mm per tooth surface (1mm per contact point).

If teeth have been separated, measure the space prior to ARS. Then measure after ARS. The difference is the actual amount of tooth reduction.

IPR: Abrasive Strips

Hand-held interproximal abrasive strips come in multiple grits. These strips are perforated to remove debris and they are autoclavable.

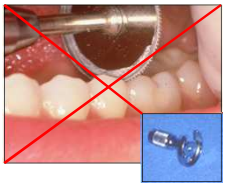
Note the IPR strip must wrap the contact of the tooth to preserve tooth contour

Anterior view of insertion of the Interproximal strip

Diamond Discs

- Meant to be used with a slow speed handpiece
- Available in many different thicknesses/flexibility
- Diamond abrasive is available on top, bottom, or both sides of the disc

Diamond/Mesh Discs



Abrasive discs can be used but using the disc guard (inset) is highly recommended!

Hi speed drill or interproximal strips may polish the surface if it is rough afterwards

Diamond Discs

1. Enter the contact while firmly retracting the lip

2. Push downward to evenly remove tissue while retracting The lip

3. As you go deeper through the contact roll the disc guard into the enamel surface to prevent the disc from skipping if it binds

ARS In Action


Parallel contacts may be trimmed directly with disk or bur

If teeth are not parallel, separators are needed

Premade finger blades for Interproximal Reduction

Quick Strips™

SpaceFile™ INTERPROXIMAL REDUCTION KIT


SpaceFile™ INTERPROXIMAL REDUCTION KIT

Biggest advantage over a quick strip is that you may use it by hand or with an air rotor handpiece system

SpaceFile™

More Options, Better Outcomes

- **8 thicknesses + contact saw = more precision and control**
- **Swiss-made quality**
- **Diamond embedded lasts longer than diamond coated quick strips**
- **Three ways to use:**
  - **Hand-held**
  - **With blue holder**
  - **With hand piece (sold separately)**

- Large range of thicknesses depending on your needs
- Blades are autoclavable and reusable for several times
- Hand grip provided in every box
- Blades are perforated to remove enamel residue
- Files are flexible to allow better adaption of the tooth surface

SpaceFile™
INTERPROXIMAL REDUCTION KIT

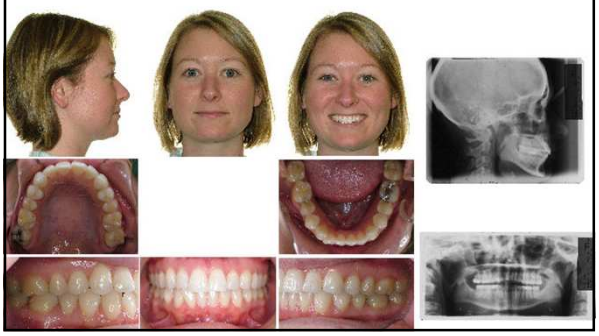
SpaceFile™
INTERPROXIMAL REDUCTION KIT

Final Result both Before and After improved the midline while reducing the Black Triangle

Ideal® Air Powered Interproximal Stripping Kit comes with an assortment of SpaceFiles™

Let's put what we learned to work…

Meet Erin



Treatment Objectives

- Resolve crowding of the incisors
- Derotate the lateral incisors
- IPR to resolve crowding with expansion of the buccal segments
- Use a removable means to treat her as she did not want braces

We used a certain commercially available aligner system to treat her.

invisalign®

It failed

Invisalign® is not a trademark of DENTSPLY.

Note after 1 reboot the lower incisor still has not moved

1st MTM® Clear•Aligner – at 6 weeks after Delivery

2nd MTM® Clear•Aligner – at 3 weeks after delivery

Final Result in less than 12 weeks

Minor Tooth Movement™ Design

Types of tooth movement possible using plastic

- Bodily/Lateral movement
- Rotation
- Tipping
- Torquing
- Space closure (diastemas/extraction space)
- Crossbite correction

Remember our Definition of MTM®

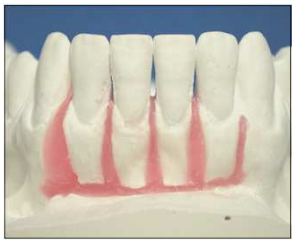
- **Based on a technique developed by orthodontist Dr. Keith Hilliard to address increased patient demand for esthetic treatment**
- **Widely published and practiced for over 10 years**
- **Uses basic orthodontic principles to achieve minor tooth movements that cost-effectively improve the patient's smile**
- **Utilizes the Hilliard Thermoplier® Pliers in combination with Essix® Plastics to fabricate clear aligners that move teeth with integrated "force points"**
- **Maximum 1mm of movement per tooth per month**

Usually requires space within the arch for teeth to move into.
Is often a cosmetic procedure.

Appliance Design of Choice

- Thermoplier® Pliers to distort the plastic to make the teeth move
- Hilliard Induced Tack (H.I.T.® – Hook Inserting Tack System)
- Divot the model
- Mounding
- Finger springs embedded in acrylic (which Material would you use???)
- Power components built into the acrylic (Inman, etc…)

How to Move Teeth Using Plastic



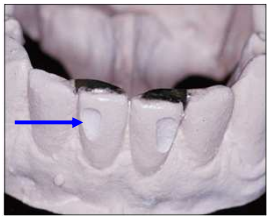
Positioner Effect:
Construct a series of appliances from repositioned teeth on a cast
Do not use wax to reposition teeth (will melt during thermoforming)

How to Move Teeth Using Plastic

Model Divoting:
make a divot on the model prior to thermoforming

Divot prior to thermoforming

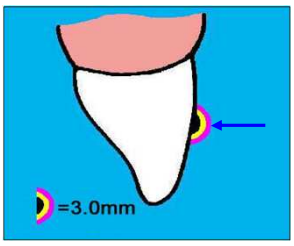
"One-time" procedure



DO NOT OVER-ACTIVATE!

How to Move Teeth Using a Plastic Aligner

Mounding:
Add layers of composite to tooth without adjusting appliance
Can place anywhere on tooth

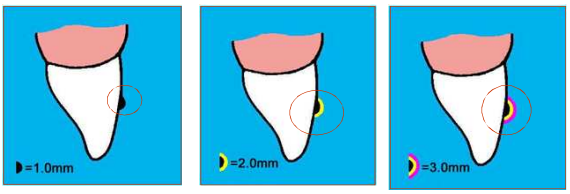


The mound is placed on the enamel surface after the appliance is constructed.

Photo courtesy Jack Sheridan, DDS

The thickness of the mound can be measured via a Bolle Gauge and recorded

Slide courtesy Jack Sheridan, DDS

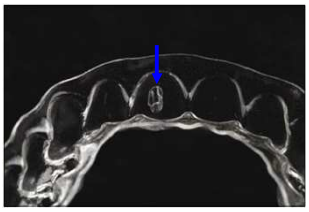


An additional composite layer on the initial mound will induce additional tooth movement with the same appliance

Slide courtesy Jack Sheridan, DDS

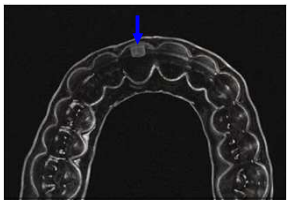
How to Move Teeth Using a Plastic Aligner

Hilliard Thermoplier® Pliers :
Create force points and protrusions to facilitate tooth movements



How to Move Teeth Using a Plastic Aligner

HIT® system
Adding prefabricated protrusions or hooks



Sheridan's First Law of Biomechanics

Force+Space+Time=Tooth Movement

- **Force** - plastic appliance or brackets and wire
- **Space** - within the arch *and in the appliance*
- **Time** – Maximum velocity of 1mm of movement per tooth per month of full-time wear

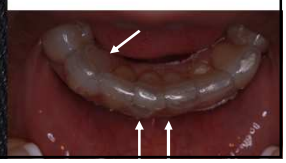
What is a conservative average amount of movement per tooth per aligner in Invisalign

Model Preparation

Blockout

The Process of creating space underneath an aligner to allow for future tooth movement

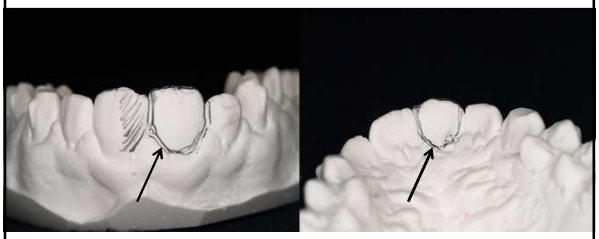
Blocking out space on your working model is demonstrated here in blue. Any material may be used. This material featured is the Gingival Dam Barricaid from the in office bleaching kit



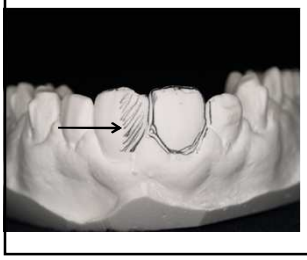
Taking your time to design where you will blockout your model

- Consider preactivating the model
- Plan for 3 months worth of movement on average

I recommend that you draw on the model to indicate where you want to block the aligner to prepare for tooth movement.



I recommend that you preactivate your models to get immediate movement out of the aligner.
This will delay thermoforming in this area for 1 visit.



Shaded area will be scraped off with a lab knife prior to thermoforming the appliance

Option #2
Create space in an aligner

When is a Window most useful?

Force on specific teeth may be created using Thermoplier® Pliers

Hilliard Thermoplier® Pliers

A clinical guide on how to use them

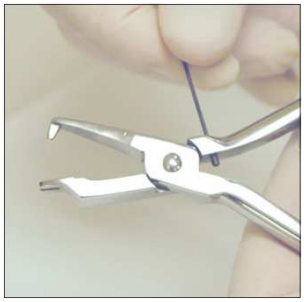
Using Thermoplier® Pliers

Step One:
Adjust Thermoplier® with hex key (really only done once when you receive them)

Step Two:
Heat Thermoplier® tip ONLY heat side that reads: "Heat this side only"

Step Three:
Measure temperature of Thermoplier®
Too hot – melt through;
Too cold – stretch

Using Thermoplier® Pliers



Step one:
Adjust plier with hex key

Heating Thermoplier® Pliers

Step two:
Heat plier tip.
ONLY heat side that reads:
"Heat this side only"

Measuring Thermoplier® Pliers

Step three: Measure temperature of plier

Too hot – melt through
Too cold – you stretch the plastic
Pliers cool approximately 10° a second

Optimal Temperatures

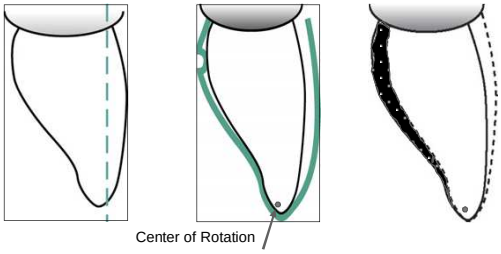
- **Essix ACE® Plastic**
  245ºF or 118ºC
- **Essix PLUS® Plastic**
  275ºF or 133ºC
- **Essix C+® Plastic**
  200ºF or 93ºC
- **Invisalign®**
  220ºF or 104.1ºC

Invisalign® is not a trademark of DENTSPLY.

The position/height of the force point on the tooth will determine the type of tooth movement that will result.

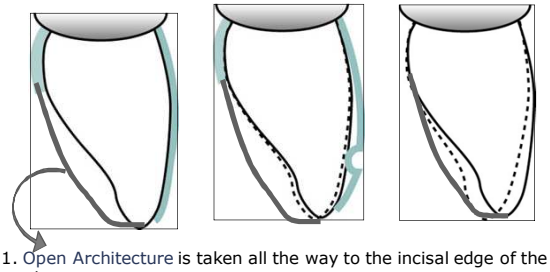
Rotations are corrected by placing the pressure point in the plastic aligner on the side opposite of the intended direction of tooth movement

Torquing a Tooth with Pressure Points



Open architecture stops short of the incisal edge to "capture" the edge of the tooth causing a center point of rotational movement.

Tipping Teeth with the MTM® System



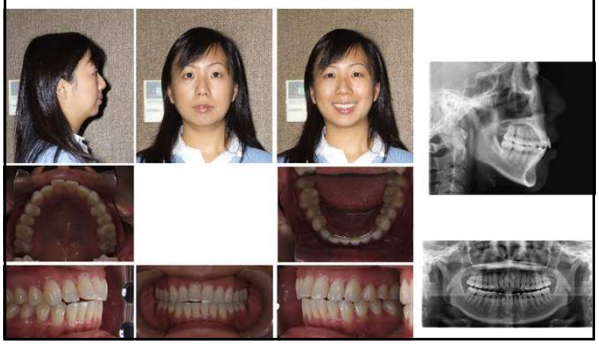
1. Open Architecture is taken all the way to the incisal edge of the tooth.
2. Place force point toward incisal edge of tooth.
3. Teeth look longer when pushed in. They look shorter when pushed out.

Force points placed at the tip of the tooth will tip the teeth.

TIPPING TEETH IN WILL MAKE THEM APPEAR ***longer***

TIPPING TEETH OUT WILL MAKE THEM APPEAR ***shorter***

Patient JD Has Mild Orthodontic Relapse. What Happened Here?



Initial Presentation

Lower Occlusal at Initial Presentation

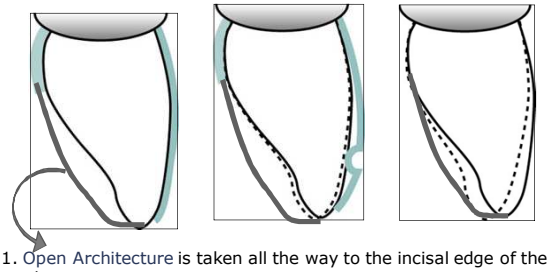
Upper Occlusal at Initial Presentation

Results Achieved in 7 Months

Final Result…
What Happened Here?

Why did the open bite close?

Tipping Teeth with the MTM® System



1. Open Architecture is taken all the way to the incisal edge of the tooth.
2. Place force point toward incisal edge of tooth.
3. Teeth look longer when pushed in. They look shorter when pushed out.

Basic Hilliard Thermoplier® Plier Kit

- Undercut Enhancer Plier – Red
- Maxillary Tooth Moving Plier – White
- Mandibular Tooth Moving Plier – Blue
- Micro-Ramp Plier – Yellow
- Large Circle Plier – Gray
- Mesial-Distal Plier – Purple
- H.I.T.® Insertion Plier
- H.I.T.® Punch Plier
- H.I.T.® Hooks (Bag of 50)
- Hakko® Digital Thermometer
- Dental Burner (with EconoGas)

Pliers listed out on Page 33-35 Jan 2011 Catalog. Hakko® is not a trademark of DENTSPLY.

Pliers may be broken into 3 groups:

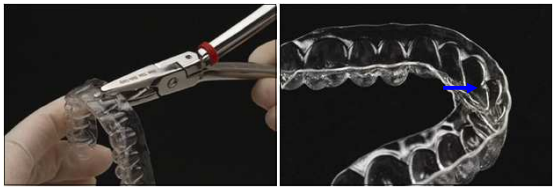
- Activators (Yellow, White, Blue, Purple, Large Circle)
- H.I.T.® System (2 Non- Colored Pliers, Large Circle)
- Retention (Red, Purple)

Plier Activation Rules

- Plier Activations occur approximately every 4 weeks. NOT SOONER!
- Pliers Must be heated…Don't tell me it works without HEAT!
- Each Subsequent activation can be over the previous activation area, but CAN NOT BE EXACTLY IN THE PREVIOUS ACTIVATION SITE

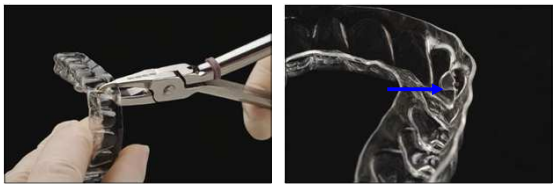
Retention Pliers

Thermoplier® Undercut Enhancer Pliers – Red



Used interproximally to improve retention

Thermoplier® Mesial-Distal Plier – Purple

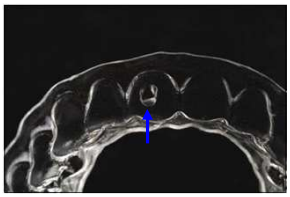


Very similar to the red plier but long and thin. Effective to tighten loose fitting appliances for people who have experienced perio surgery and have long interproximal contacts.

Activation Pliers

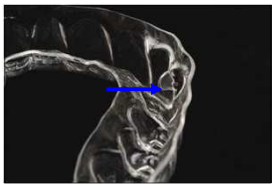
Thermoplier® Maxillary Plier – White

Conforms to the morphology of larger maxillary teeth



Used to tip, torque, or rotate teeth
Usually center of the tooth due to large size

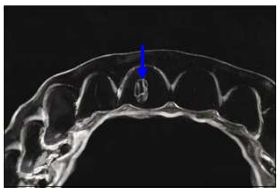
Thermoplier® Mesial-Distal Plier – Purple



Good for Diastema closures
Very similar to the maxillary plier but thinner. Effective for rotating lower teeth, especially canines.

Thermoplier® Mandibular Plier – Blue

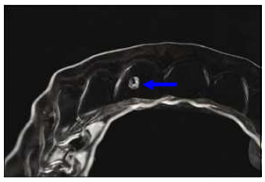
Conforms to the morphology of mandibular teeth

Used to tip, torque, or rotate teeth
Good with smaller maxillary teeth too

Thermoplier® Micro-Ramp Plier – Yellow

Good for tipping, torquing, or rotating teeth
(poor choice for maxillary teeth)

Provides up to 2 mm force point at most

Thermoplier® Large Circle Plier – Gray

Good for pushing maxillary incisors Buccal.
Also used to "push" platforms out from teeth for the HIT SYStem (will be reviewed later)

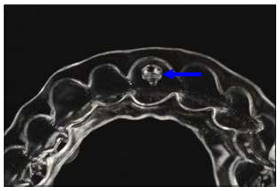
Additional Hilliard Thermoplier® Pliers Available

- Thermoplier® Bite Plane Pliers
- Thermoplier® Small Circle Pliers
- Thermoplier® Bubble-Forming Pliers

I would recommend purchasing a Thermoplier® Small Circle Plier if you buy an MTM® Introductory Kit

Thermoplier® Small Circle Plier – Pink

Used to increase depth of force point



Get a smaller "wedding cake" effect as shown on right

Cookie Cutter Plier Combination for Generic tooth Movement

(Each color represents 1 month of activity)

- Yellow
- Purple (Optional)
- Blue
- White

Plier Combination for moving a Maxillary Incisor

- Purple (Optional)
- Blue
- White
- Gray (optional)
- Blue
- Pink
- Gray (Wedding cake Effect)

Plier Combination to Rotate a Lower Canine

- (2) yellow one on top of the other
- Blue
- White
- Purple
- Blue
- White

Break time

Preparing for Thermoforming

Choose your Material to Thermoform

- Essix ACE® Plastic (Clear material with a green Essix® protective film on both sides)
- Essix C+® Plastic (Cloudy material- NOT perfectly clear)

Plastic available in:

- 5” squares
  - Most vacuum machines
- 125mm circles/squares
  - Biostar®
- 125mm circles
  - Mini-star®
- 120mm circles
  - Drufomat
  - Erkopress®

Biostar, Mini-star, Drufomat and Erkopress are not trademarks of DENTSPLY

Plastic uses:

- **Bleaching Tray**
  - 0.020” – 0.5mm
  - 0.030” – 0.75mm
- **Tooth Movement**
  - 0.030” – 0.75mm
  - 0.035” – 0.88mm
  - 0.040” – 1.0mm
- **Retention (referred to as a “Trutain”)**
  - 0.035” – 0.88mm
  - 0.040” – 1.0mm
- **Mouthguards/Nightguards/Dual Laminates**
  - 0.080” – 2mm
  - 0.120” – 3mm
  - 0.160” – 4mm

Essix ACE® Plastic

- Crystal Clear
- Copolyester
- Rigid yet durable
- 18-24 months wear
- Accepts bonding material

Essix ACE® Plastic

- Green logo protective sheets
- 0.030”, 0.035”, or 0.040” thicknesses

Essix ACE® Plastic

- Good for retention
- Excellent for temporary bridges
- Excellent choice for building aligners to create Minor Tooth Movement™ appliances

Essix C+® Plastic

- Excellent retainer for bruxers
- Good for Minor Tooth Movement™

Essix C+® Plastic

- Long retainer life (2+ years)
- Polypropylene
- Contact clarity
- Highly durable

Essix Plus® Plastic

- Longest retainer life (2+ years)
- Hybrid Copolyester
- Greatest clarity of all of the plastics
- Highest durability
- Exceptionally flexible

Selecting the right plastic

	Essix ACE® Plastic	Essix C+® Plastic	Essix® Plus Plastic
Ideal retention for non-bruxer	X		X
Retention for bruxer		X	X
MTM® with Thermoplier® Pliers	X	X	
Accepts bonding agent/acrylic			X
Consistent thermoforming	X		X
Clarity	Best	Good	Best
Average life (months)	18-24	24+	24+

Instructions for Use as a Retainer

- Patient should wear at night only for a minimum of 8 hours
- Do not use tooth paste or toothbrush on appliance since either can scratch the plastic
- Retainer should be cleaned daily with appropriate cleaner

Instructions for Use as an MTM® Appliance

- Patient should wear 24 hours excluding eating and cleaning teeth for entire duration of tooth movement
- Patient should be given same cleaning instructions as for retainer
- Do not use tooth paste or toothbrush on appliance since either can scratch the plastic

The MTM® Clear•Aligner In-Office System

Part III Pontics, Diastema Closures and General Alignment

Neil M. Warshawsky D.D.S., M.S., P.C.
Diplomate, American Board of Orthodontics

Essix® Pontics

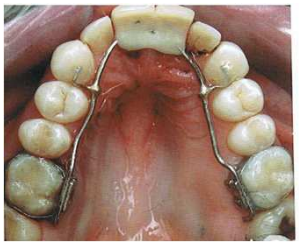
- Replaces the flipper type Hawley
- Superior esthetics
- Not to be worn while sleeping since, for esthetic reasons, it is worn all day

Single Tooth Edentulous Site

Flipper with Retentive Ball Clasps

Note the appliance must be fairly thick so the tooth does not break off

Fixed Provisionals were Made on Orthodontic Bands when Multiple Teeth were Involved



Why learn to make retainers with Essix® Pontics?

- Clear retainers with provisional teeth are easy to make
- Your patient will be impressed by the comfort and esthetics
- You can keep it in house so turn around time is faster
- You can charge for your time and make a significant profit margin

Essix® Pontics Design

- Pontic specifically designed to mechanically lock into plastic
- Allows trimming of gingival third
- Multiple shades
- Multiple sizes

Essix® Pontics

Place separating liquid or Trim-Rite® Release Agent into the edentulous area

Essix® Pontics

- Pontic is fit to the cast
- The Pontic is then secured to the cast with acrylic
- DO NOT USE WAX, it will melt during thermoforming

Essix® Pontics

Channel on the lingual of the pontic mechanically locks the pontic into the provisional bridge

Aligner Anterior Pontics are very Effective

- Implant cases
- Patients state this is more comfortable than a flipper
- Tooth movement can still occur in a very esthetic manner where you may hide Pontic space simultaneously

Initial Treatment - Pontics

Without aligner

With aligner

Other Essix® Innovations

Hook Inserting Tack (H.I.T.®) System

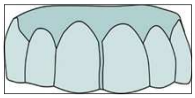
H.I.T.® Hook Inserting Tack System

- H.I.T.® Hooks

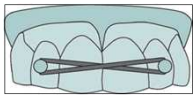
- Hook-inserting Pliers

Final aligner prior to cutting and polishing to close midline diastema

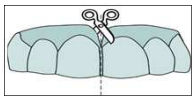
Closing Space



1. Make 7-7 appliance



3. Create hooks on both cuspids (or laterals)



2. Cut appliance in half

4. Place in mouth and add elastic

Diastema to be closed with a H.I.T.® System aligner

Completed space closure (Note bonded retainer)

A Quick Review of the H.I.T.® System

Aligner Cut, Polished, and H.I.T.® System platforms created

Buccal View of Prepped Aligner

H.I.T.® System Hooks in place

Aligner Cut and Polished

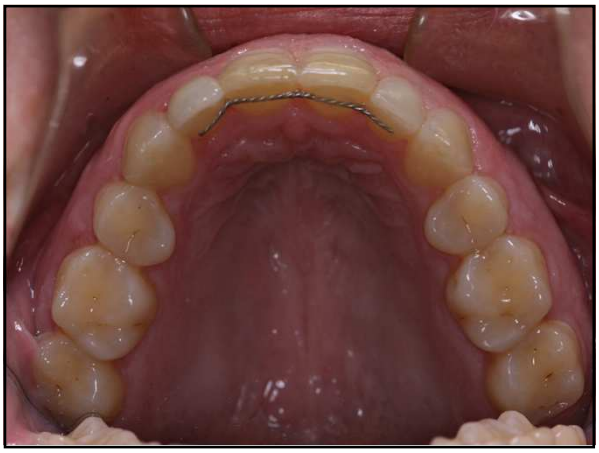
Final H.I.T.® System Aligner

What else can a H.I.T.® System aligner fix?

- Close excess space around lateral incisors
- Close food traps
- Class II elastics
- Relapse
- Your imagination is the limit!

The Space is Obviously unattractive

The Space is Corrected in 4 Months



4 Months later

H.I.T.® retainer to close multiple spaces

What do you do if there is more than 1 space to close?

Treatment Plan

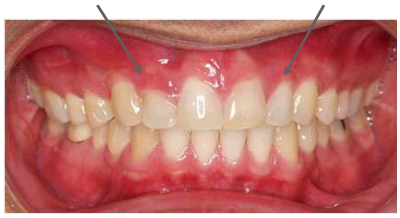
- Close anterior space on the left first
- Once the space closes I would build a second HIT appliance to close the space ont eh right buccal segment
- After completion of the right buccal segment I would close space on the left buccal segment

Results at 5 weeks

Second Aligner Built 12 weeks to Address Lateral Spaces

Occlusal change

13 Months Later He is Still Looking Good… Space is LESS Visible!



Note the new problem on the lateral incisor

Look what a 5 Minute Laser Gigivectomy can Do!!

9 months later spaces are *Still closed!*

How much change can you really create?
Let's take a look at what you can accomplish once you are comfortable using the system!

Patient TM Challenging Space Closure and Deepened Overbite

2 years of Treatment later

Objective Assessment of Progress

Objective Assessment of Progress

How Predictable is the MTM® System at Treating Mild Crowding?

Erick Complained of his Anterior Crowding

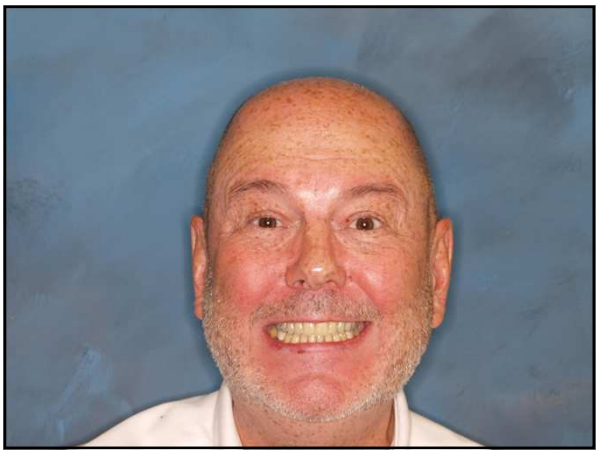
4 Month Progress

7.5 Month Progress

Note retainers only worn at night initially

Patient was pleased with result and did NOT want a fixed retainer

Progress at 7.5 Months



Clinical Case Examples

Class I Malocclusion Space Required for implant at #3

Treament Objectives

- Limited Orthodontics to create Implant Site
- Use of a TAD to prevent unwanted movement
- IPR to resolve crowding with mild flairing of the anterior teeth
- 6 Prebuilt aligners were constructed to align the anterior teeth off a single impression
- Once the Minimal work was complete the upper arch was to be Esthetically redone and reconstructed

Site prepared in 6 months

Not bad for Minimal Hardware

Effective Result took 7 months

Case to document Speed and Control

Minor relapse

Treatment Objectives

- Due to veneers on the upper teeth the patient only wanted to correct the lower orthodontic relapse.
- Minimal IPR was required to resolve the crowding of the lower anterior teeth.
- The movement was attempted with one aligner, in the end a second aligner was required to complete the move.

2 month change

Lower occlusal change at 2 months

Is this Movement Tipping or Torqueing?

Finished Case 6 Months 2 Weeks

Remember him?
Initial Presentation

Treatment Objectives

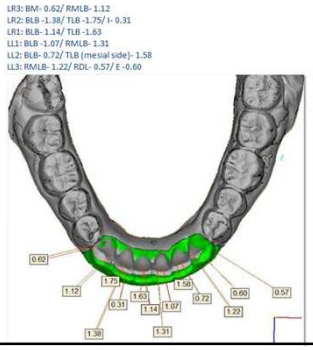
- Resolve crowding of the anterior teeth using an Essix® Plastic Retainer
- IPR would be applied minimally to the lower anterior teeth to assist in the alignment
- Due to the extensive rotations force couple would be applied to help unrotate teeth

Results after 3 months

3 Month Change

6 Months Yielded Nice Results

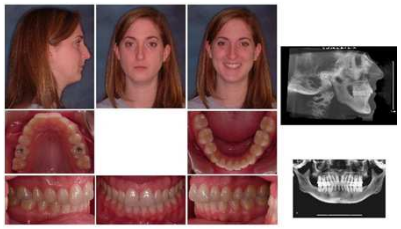
Clinical results

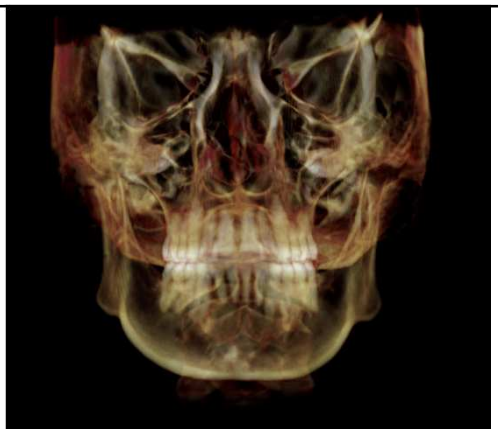


Is the MTM® System Predictable?

YES!

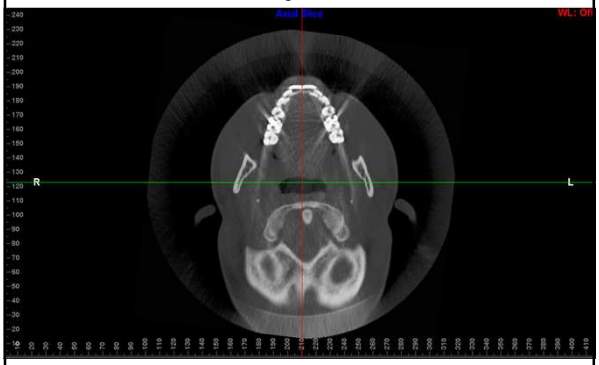
Classic example





Submental Vertex shows the crowding is Real

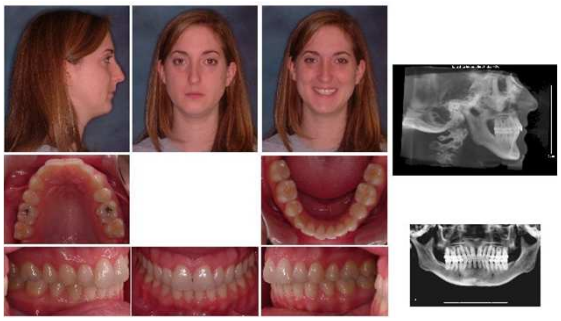
Axial Slice Indicates crowding is in both arches



13 months and 7 visits later

What did you charge?

Did I neglect to tell you she had a Twin Sister?



Successful Results in under 8 Months

In Review… What is MTM® In-Office?

- Based on a technique developed by orthodontist Dr. Keith Hilliard to address increased patient demand for esthetic treatment
- Widely published and practiced for over 10 years
- Uses basic orthodontic principles to achieve minor tooth movements that cost-effectively improve the patient's smile
- Utilizes the Hilliard Thermoplier® Pliers in combination with Essix® Plastics to fabricate clear aligners that move teeth with integrated "force points"
- Maximum 1mm of movement per tooth per month
- It is an excellent technique that will benefit your patients and add value to your practice

Thank You for Your Attention

Email me with questions at

DRNEIL@GETITSTRAIGHT.COM

Or Check us out at

WWW.GETITSTRAIGHT.COM