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Forsus™ Fatigue Resistant Device Treatment Guide

Efficient, Reliable Class II Correction

FORSUS™ Fatigue Resistant Device

FORSUS™
Fatigue Resistant Device

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3M

Chapter 1

Introduction

Why Choose the Forsus™ Fatigue Resistant Device?

Class II Correction is a common orthodontic case requirement. The options for Class II treatment have traditionally presented a difficult decision. Choices were limited to fixed intraoral devices with known breakage concerns, or other appliances – including headgear – that require patient compliance.

The Forsus™ Fatigue Resistant Device, now with more than ten years of clinical use, overcomes these concerns and limitations. We hope you find the Forsus corrector is an easier and more reliable way to handle Class II correction.

Easy Installation

The Forsus appliance eliminates time-consuming laboratory setup. It is designed to be an “out of the box” appliance for easy chairside installation in one appointment. It does not require removal of the bracket or archwire for placement.

Patient-Compliance

Patient compliance is minimized with Forsus correctors. The fixed appliance does not require the patient to remove, install or adjust the device during treatment in order for it to work properly, and therefore the Forsus device is working consistently.

Consistent Forces

Forsus™ Class II Correctors maintain a consistent level of force throughout treatment (Table 1). Correct activation of the module exerts approximately 200 grams of force. Forsus Correctors consistently apply light force as compared to intermittently applied forces, such as that offered by facebows.

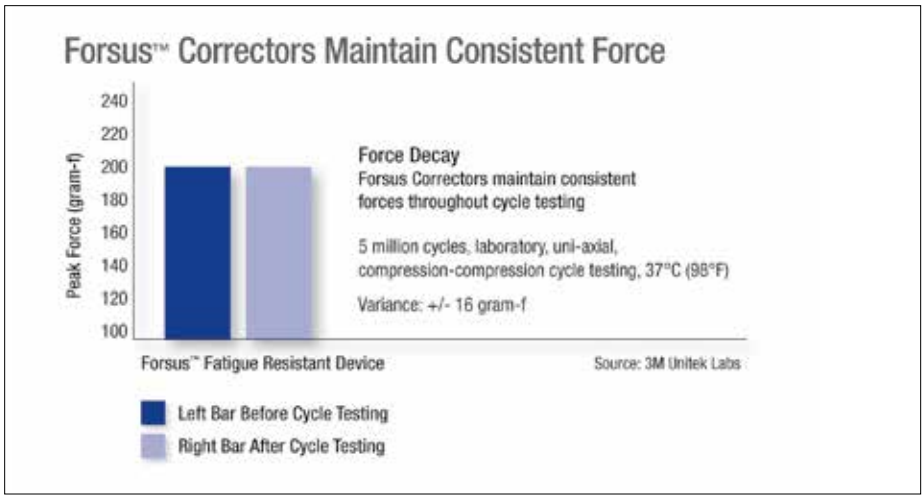


Table 1: Forsus™ Correctors Maintain Consistent Force.

Durable

Fatigue resistance is essential to successful orthodontic outcomes. The Forsus Fatigue Resistant Device is designed to perform reliably throughout the course of treatment. The unique coaxial spring design addresses the issue of fatigue failure. Lab testing was performed equal to 6 months of treatment time. Prior to cycling, both the Forsus device and a competitive telescoping spring had very similar load-deflection curves. However, after the cycle test, as the chart indicates, the competitor telescoping spring shows marked force degradation while the Forsus device maintained its consistent force delivery profile (Table 2).

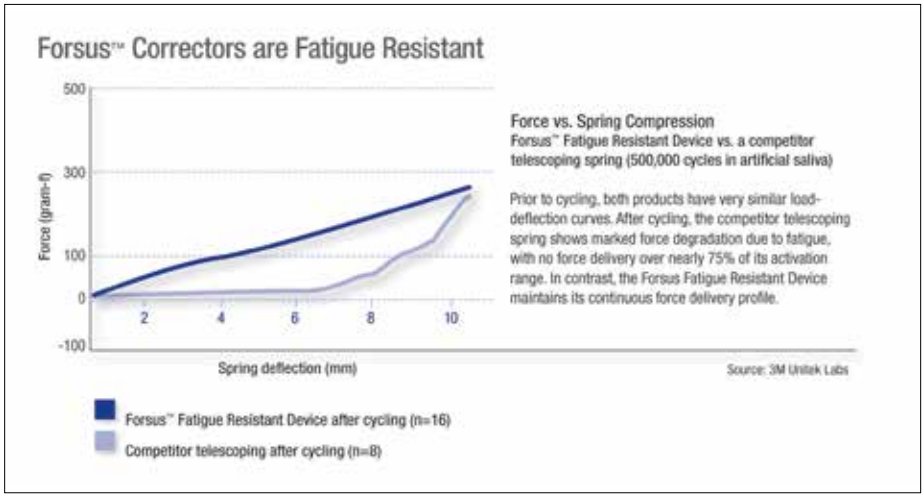


Table 2: Forsus™ Correctors are Fatigue Resistant.

Patient-Friendly

The compact size of the Forsus corrector helps the patient feel less discomfort. Due to the spring and telescoping cylinder design, it does not bow outward when compressed. This linear motion of the spring minimizes discomfort and assists with durability.

Because the Forsus corrector does not require patient compliance, the patient and/or the parent(s) do not have to worry about the amount of time the device is actually worn.

Hygiene

The open coil spring assembly design aids in hygiene and allows food to be brushed out of the device easily, minimizing food traps.

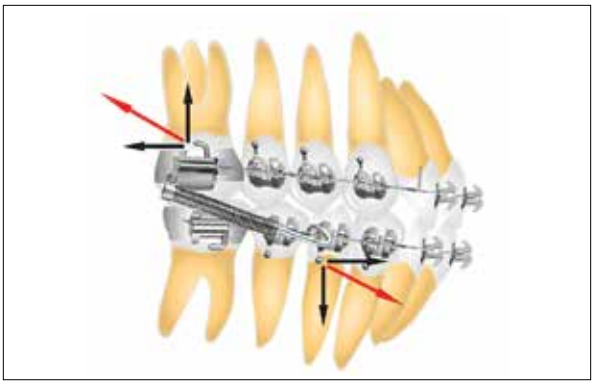
Predictable

The long-lasting and consistent forces along with the compliance-free design of the Forsus device allow for more accurate predictions in treatment time and outcome.

Versatile

The Forsus Fatigue Resistant Device can be used in a variety of Class II cases, including, but not limited to, deep bite, open bite, molar distalization, extraction, mixed dentition, and midline correction. The Forsus device allows for different size requirements for a patient's right and left sides. If desired, it can also be used unilaterally.

How Does the Forsus™ Fatigue Resistant Device Work?



Force Vectors Associated with the Forsus™ Fatigue Resistant Device.

The Forsus device is attached to the maxillary molar headgear tube and mandibular archwire, creating a mesial force on the mandibular arch and a distal force on the maxillary arch.

The intrusive force on maxillary molars can decrease posterior vertical dimension. The intrusive force can intrude mandibular incisors.

Chapter 2

Components

The Forsus™ Fatigue Resistant Device is a Class II corrector that is easy to implement in the orthodontic practice. There is a minimal number of supplies needed to get started.

Spring Modules

EZ2 Module

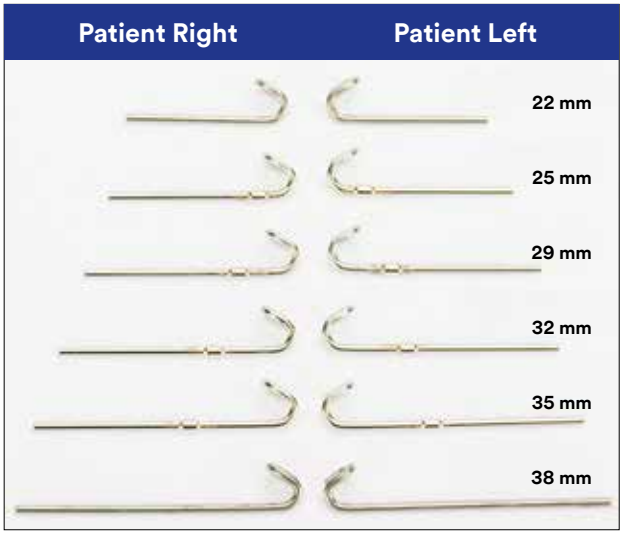
The EZ2 module allows for more consistent installation and automatically prevents the spring from pivoting toward the cheek. The EZ2 module can be used only with an occlusal headgear tube and has permanently marked indicators for the left and right sides.

EZ2 Module.

L-pin Spring Module

The L-pin module allows for more flexible installation options and movement in the mouth. It can be used with a gingival or occlusal headgear tube. The left and right sides are universal.

L-pin Module.



Actual size shown.

Push Rods

The push rods come in six different lengths and are oriented to the patient's right and left.

Measurement Gauge

The measurement gauge is used to select the correct push rod length. See Page 17 for use.

Headgear Tube on Band

A band and an occlusal or gingival headgear tube (that fits .045 or .051 inch headgear) are needed to use the Forsus™ Fatigue Resistant Device.

For the Forsus EZ2 Module, an occlusal headgear tube measuring 3.6 - 4.3 mm is required. The L-pin module can be used with either occlusal or gingival tubes of varying lengths.

NOTE: The Forsus EZ2 Module is fully compatible and designed to fit best with 3M Unitek Buccal Tubes.

Rectangular Archwires

A minimum of 0.017 × 0.025 Stainless Steel archwire is recommended for 0.018 slot in the maxillary and mandibular arches.

A minimum of 0.019 × 0.025 Stainless Steel archwire is recommended for 0.022 slot in the maxillary and mandibular arches.

Instruments

Weingart Utility Pliers
REF 900-700

Wire Cutter
REF 900-752

Split Crimps

Split crimps are used to reactivate the spring module as treatment progresses. The recommendation is to add one split crimp (1.5 mm of activation) to the push rod, and if another crimp is needed, move to the next size push rod.

Kits

The Forsus™ Fatigue Resistant Device is available in 5- and 20-patient kits.

Optional: Elastomeric Ligature with Guard

The guard will act as a cushion for the sliding push rod to contact, potentially reducing bracket failure.

Silver: REF 406-429 (pack of 100 ligatures)
Clear: REF 406-430 (pack of 100 ligatures)

Chapter 3

Treatment Planning Tips

Most Class II malocclusions can be treated with Forsus™ Correctors as part of fixed appliance therapy. The most effective way to use the Forsus corrector is as a part of the initial treatment plan, rather than as a non-compliance alternative. The long-lasting and consistent forces along with the compliance-free design of the Forsus device allow for more accurate predictions in treatment time and outcome.

When treatment planning with the Forsus appliance, be sure to:

1. Assess mandibular incisor position
    a. Factor in existing proclination and any additional proclining that will occur when eliminating crowding and the Curve of Spee.
    b. Consider whether extractions or interproximal reduction may be indicated to upright mandibular incisors where proclination is excessive.
2. Consider skeletal maturation and growth potential of the patient. In non-growing patients, dental alveolar treatment effects should be expected.

Chapter 4

Patient Consultation

Presenting the Forsus™ Fatigue Resistant Device during the New Patient Consultation is a great opportunity to introduce the benefits of the appliance and eliminate any concerns the patient or parents may have.

When presenting the Forsus appliance, it is important to emphasize why your office has chosen to use the Forsus appliance. Keep the following tips in mind:

1. Save treatment time by planning to use the Forsus appliance from the initial consultation rather than using it as a fall back option for non-compliant patients who fail to wear elastics or headgear.
2. Explain and demonstrate a Class II malocclusion, or the patient's specific malocclusion.
3. Introduce the Forsus appliance and explain how it will help correct their malocclusion.
4. Explain why your office has decided to treat with the Forsus Appliance (predictable treatment time, predictable results, no headgear, avoiding extractions, etc.).
5. Describe how successful other patients have been with their Forsus appliance and how pleased they are with the results.

Highlight Patient Benefits of the Fixed Appliance

a. **Great alternative:** Compare its ease of use and aesthetics over other techniques that require extractions, headgear, elastics, and removable functional appliances.

b. **Works consistently:** The fixed appliance does not require the patient to remove, install or adjust the device during treatment in order for it to work properly, and therefore the Forsus device is working consistently.

c. **Comfort:** The compact size of the Forsus corrector helps the patient feel less discomfort. Due to the design of the spring and telescoping cylinder, it does not bow outward when compressed.

d. **Predictable treatment results and treatment time:** The long-lasting and consistent forces, along with the reliability of the Forsus device, allow for more accurate predictions in treatment time and outcome.

Set Treatment Expectations

a. Give patients realistic expectations on adapting to the appliance. It will be similar to getting used to braces.

b. Describe the appliance as durable but not indestructible and proper care will be needed.

c. Share approximate treatment timing with patients to give them an understanding of how long they will be wearing the Forsus corrector.

d. Average treatment time is 4-6 months.*

Suggested Patient Consultation Tools

- Forsus Fatigue Resistant Device Typodont – EZ2 Module (REF 600-233)
- Forsus Introduction Patient Brochure (REF 016-963)
- Practice Marketing CD
- Dolphin Aquarium video
- Pictures of other patients smiling while wearing the Forsus Appliance

* Dr. Franchi found “the mean deviation of the FRD [Forsus™ Fatigue Resistant Device] active phase was 5.2 +/- 1.3 months”.
Effectiveness of comprehensive fixed appliance treatment used with the Forsus Fatigue Resistant Device in Class II patients
Franchi, L., Alvetro, L., Giuntini, V., Masucci, C., Defraia E., & Baccetti, T. (2011) *The Angle Orthodontist,* 81(4), 678-683.

Chapter 5

Installation Instructions

The Forsus™ Fatigue Resistant Device is designed to be an “out of the box” appliance for easy chairside installation, without removing the bracket or archwire. It is important to install the device at the proper time in treatment after completing the following steps:

- Align the mandibular arch to the point that a rectangular archwire can be placed.
- Keep in mind the maxillary transverse width must be great enough to accommodate an advanced mandibular position (relative maxillary transverse deficiency). If necessary, coordinate the transverse dimension of the maxillary and mandibular arch.

Once these steps are complete, the Forsus Fatigue Resistant Device can be installed.

Determining Push Rod Position

There are three options available to place the push rod:

Bicuspid

Placing the push rod distal to the bicuspid is a more recent recommendation for placement. The benefits of placing the push rod distal to the bicuspid include improved patient comfort, better aesthetics and reduced interference.

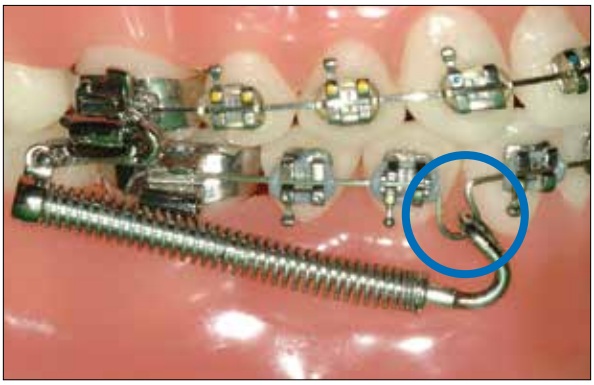
Clinical Tip

Because of the increased vertical angle, a lower first bicuspid installation can lead to more upper 1st molar intrusion and should be monitored for this possibility.

Cuspid

The traditional location to place the push rod is distal to the cuspid. Placement behind the cuspid will work in most cases, especially when the bicuspid is not an option, for example:

- When placement at first bicuspids is over-active with a 22 mm push rod
- When placement is more vertical than needed
- Severe Class II malocclusions where a large portion of the discrepancy is from a retruded mandible



Omega Loop

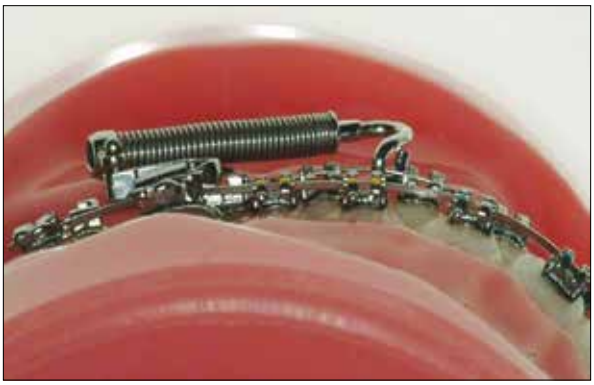
Using an Omega Loop allows the angulation to be varied. It will also keep the push rod from contacting the bracket.

Clinical Tip

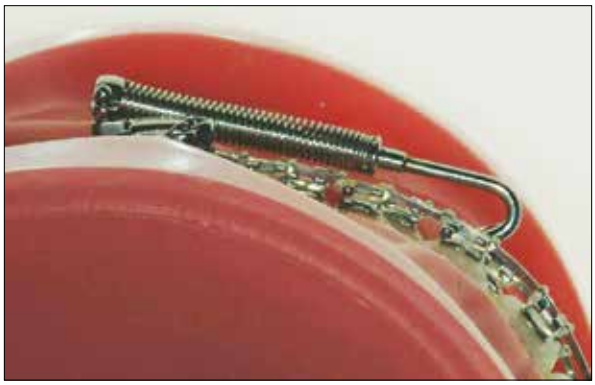
Because of the increased vertical angle, an Omega Loop installation can lead to more upper 1st molar intrusion and should be monitored for this possibility.

Comparison of Bicuspid and Cuspid Placement

Notice the profile difference between the first bicuspids and the cuspid placement locations.



Push rod placement at first bicuspid.



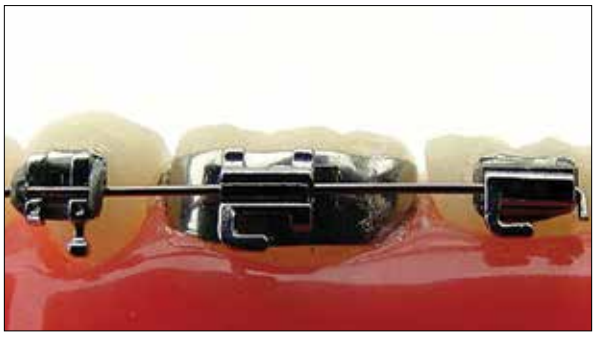
Push rod placement at cuspid.

Cuspid vs. first bicuspid placement.

Preparing the Arch for Installation

1. Install rectangular archwires (minimum of 0.017 × 0.025 Stainless Steel in 0.018 slot, minimum of 0.019 × 0.025 Stainless Steel in 0.022 slot).
2. To secure mandibular arch teeth positioning and prevent lower anterior flaring, please consider the following options:
   - Make sure lower anterior brackets have adequate negative torque or consider Variable Prescription Orthodontics (VPO).
   - Cinch back mandibular archwire distal to terminal molar, tying arch together as a unit.

First Molar Option.



Second Molar Option.

- Lace the entire mandibular arch from first molar to first molar under the archwire. This can also reduce the occurrence of ligature breakage from the friction of the push rod.

3. To prevent rotation and debonding, please consider the following options:

   - Steel ligate lower bracket mesial to push rod placement (cuspid or bicuspid).

   - Place elastomeric ligature with guard under the archwire on the bracket of the tooth mesial to the push rod to prevent contact; the pad should face distally. This will add 1.5 – 2 mm of activation to the push rod.

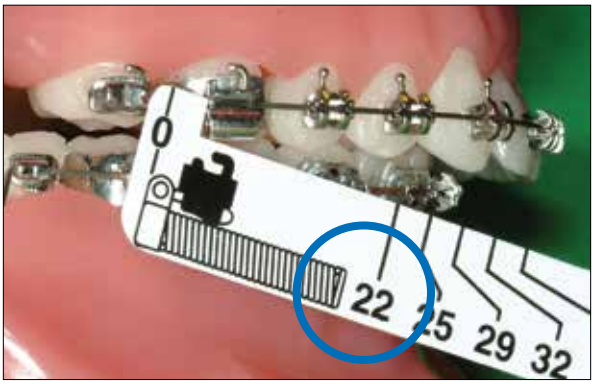
   - Install a stop, such as a Gurin lock, distal to the bracket where the push rod will be placed, to avoid contact with the bracket.

Installing the Forsus™ Fatigue Resistant Device

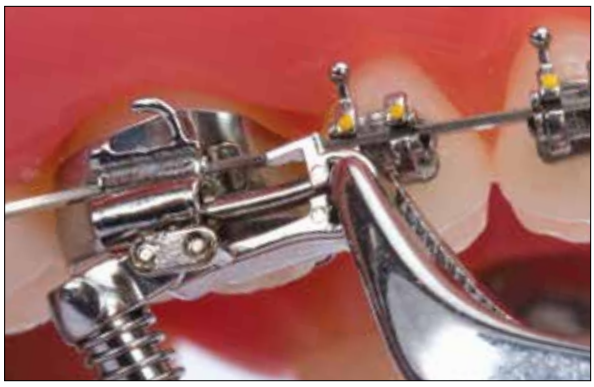
Push Rod Selection

1. Use the Measurement Guide to determine correct push rod length, depending on the selected push rod location (distal to cuspid, bicuspid, Omega loop).
   a. Measure each side from the distal end of maxillary molar tube to the distal side of the chosen mandibular stop, having the patient bite in centric occlusion without advancing the mandible. When in doubt, use the shorter length push rod.
   b. Select the Right and Left configuration push rods from the available sizes.

NOTE: It is important to measure both the right and the left sides.



2. Once the correct push rod size is selected, install either the EZ2 or L-pin spring module.



EZ2 Module Installation

1. Clear headgear tube to ensure there is no blockage from debris.

2. Holding the mesial portion of the Forsus™ Fatigue Resistant Device EZ2 Module with Weingart utility pliers, insert the clip into the headgear tube from mesial to distal until it clicks into place. (**NOTE:** Right and Left configuration denoted by “R” or “L” on each module.)

3. Lightly tug on the clip to ensure the clip is properly engaged.

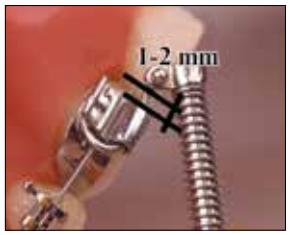
Clinical Tip

Avoid rolling the wrist during insertion. Be sure to guide the clip straight into the tube.

L-pin Installation

1. Clear headgear tube to ensure there is no blockage from debris.
2. Insert L-pin into spring module, making sure the ball is positioned buccally.

3. Insert L-pin into headgear tube from distal to mesial. Allow 1 to 2 mm of clearance between distal end of buccal tube and the universal spring eyelet.



4. Bend L-pin occlusally or gingivally.
   - If bending the L-pin occlusally, flip the spring module toward the gingival, bend the L-pin to the occlusal and then let the spring fall into position. To prevent excess buccal travel, you can tuck the tip behind the tube.
   - If bending the L-pin gingivally, bend the L-pin over the gingival tube. The L-pin can also be secured behind the elastic hook.

Clinical Tip

1. If you discover that the L-pin is too long in relation to your headgear tube, the L-pin can be trimmed to make installation easier.
2. By turning the L-pin up and over the head gear tube, you keep it out of the occlusion and away from the cheek.

Place push rod distal to selected position.

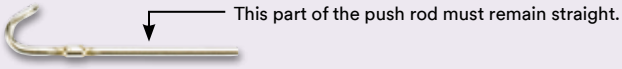
Crimp push rod.

Push Rod Placement

1. Select appropriate side (right or left) push rod (see Page 6).
2. Place the push rod loop over the archwire distal to the selected position (first bicuspid or cuspid).
3. Have the patient open his/her mouth, compress the spring, and insert the push rod into the spring.
4. Once the push rod is placed in the correct position, have the patient bite down in centric occlusion and double check the spring activation.
   - Correct activation exerts approximately 200 grams of force.
   - There should be 2 mm of space (1 mm minimum) between the completely compressed spring and the stop on the push rod, with patient in centric occlusion.
5. Crimp the mesial end of the push rod with Weingart pliers to close the loop around the archwire.
6. Check for any interference with the spring module, push rod, or brackets.
   - Have patient bite down and open and repeat.
   - Have patient slide mandible from side to side.

Clinical Tips

1. With the L-pin, if patient bites on the spring assembly, adjust L-pin or entire assembly with a buccal offset by pulling the distal end cap toward the buccal with a pair of Weingart pliers.
2. If additional clearance is required, the push rod can be adjusted mesial to the stop. The portion distal to the stop must remain straight.



3. With the EZ2 module, occlusal interference indicates the maxillary arch may be too narrow compared to the mandibular arch. Consider using L-pin assembly, which is adjustable to avoid interference.

Correctly Installed Forsus™ Fatigue Resistant Device

EZ2 Module.

L-pin Module.

Clinical Tip

Avoiding Overactivation

It is important to avoid overactivation. If the push rod protrudes distally of the spring module in centric occlusion, the spring is overactivated because the push rod is too long. Overactivation can result in:

- Debonding of brackets
- Unwanted dental movements
- Flaring of mandibular incisors
- Unplanned rotations
- Breakage

Note: If the push rod is overactivated, switch to a shorter push rod.

Correct Activation

Correct activation.

Overactivation

Overactivation results in tube being pushed beyond the end of the spring.

Correct activation.

Overactivation causes the spring to look fully compressed.

Chapter 6

Patient Instructions

Now that the Forsus™ Fatigue Resistant Device is installed, it is important for the patient to understand how to best take care of the appliance to get the desired results.

After Forsus Correctors are installed, provide the Forsus Correctors patient brochure (REF 014-462) and share the following information with your patient.

Adjustment Time

- Getting comfortable with the new appliance may take approximately a week or so. As with any orthodontic appliance inside the mouth, some discomfort or irritation may occur. Have the patient call the orthodontic office if discomfort or irritation continues or if a sore develops.
- Inform the patient that it may feel like the teeth do not fit together. This feeling will go away as the teeth adjust.

Proper Fit

- The Forsus appliance will accommodate normal mouth opening for eating and speaking. It is recommended that the patient not open the mouth extremely wide while eating, otherwise the appliance may deform, separate or loosen a molar band, requiring a return visit to the orthodontic office.
- The appliance is designed to stay away from the teeth when patients open and close their mouths. If, for some reason, it gets between the teeth, be sure to tell them not to bite on it. Biting on the appliance may deform or break it, or cause injury to the inside of their mouth. Have them call the orthodontic office if the problem occurs.

Care

- Care must be taken with what the patient eats. Avoid hard or sticky foods and be sure to cut food into smaller pieces.
- Brushing is always recommended after every meal. Take special care when wearing the appliance to avoid dislodging or separating the appliance.
- The Forsus appliance is designed to be durable and withstand normal intraoral forces; it is not, however, indestructible and can be damaged or broken. Ensure the patient is aware that proper discretion must be taken while wearing the appliance.
- It is important for the patient to keep scheduled appointments. The Forsus appliance is designed to continue working, which may result in overcorrection.

Clinical Tip

Handling Emergencies

If the spring and push rod separate while away from the orthodontic office, here are possible solutions:

Step 1.

Step 2.

- Instruct the patient how to compress the spring and insert the push rod.

- If the patient has trouble re-engaging the spring, or if something has broken, the patient can temporarily secure it with elastics or dental floss.

Note: If either the spring or the push rod entirely disconnects, so that it is loose inside the mouth, advise the patient to remove the loose piece from the mouth to avoid swallowing.

Chapter 7

Forsus™ Correctors in Treatment

What to Look for at Each Appointment

It is important to keep all scheduled appointments to monitor progress. At each appointment, you will want to check how the appliance is performing.

1. Check activation in centric occlusion in 6-8 week intervals.
   a. If the spring module compresses more than 2.5 mm above the stop on the push rod and additional correction is required, reactivate the appliance. See Reactivation Instructions on Pages 26-27.
   b. Typical reactivation is a single split crimp placed on the push rod above the stop (except for the 22 mm push rod).
   c. Forsus Correctors may be activated unilaterally.
   d. After the first reactivation, replacement of the push rod with a larger size may be indicated.
2. Evaluate maxillary incisor torque. Ideal torque needs to be maintained to avoid overretraction of the maxillary dentition.
3. Evaluate mandibular incisor proclination. Excessive proclination will result in the elimination of the overjet while the buccal segments are still Class II.
4. If the maxillary archwire has not been cinched distal to the molar, ensure the maxillary wire length is adequate to avoid the tube backing off the end of the wire.
5. Check that the spring modules are not interfering with the occlusion.
6. Check wire engagement in all brackets and check that the steel ties on cuspids or first bicuspids, dependent upon push rod placement, are secure.
7. Once the desired amount of correction is achieved, it is recommended to keep the non-activated appliance in place for at least one appointment interval. "Non-activated" means that the Forsus Corrector spring module is not compressed by the push rod as the patient bites down.

Reactivating the Forsus™ Fatigue Resistant Device

As treatment progresses, reactivation of the spring may be necessary to reach the desired Class I relationship.

1. To check the activation, have the patient bite in centric occlusion, hold the push rod and completely compress the spring. Activation will depend on the amount of push rod visible between the stop and the spring.
2. Push the spring back and check to see if there is 2.5 mm of space between the push rod stop and the end of the spring.

3. Have the patient open his/her mouth as wide as they can. If the patient can open their mouth fully without the push rod disengaging from the spring, the Forsus push rod can be reactivated.

   Option 1: Compress the spring so that the push rod is exposed and place a split crimp distal to the stop on the push rod.

   Option 2: However, if the push rod disengages from the spring, remeasure and select the appropriate larger size of push rod to install instead of using a split crimp.

4. Cinch the crimp onto the push rod. This will provide 1.5 mm of activation.

Clinical Tips

1. If greater than the 1.5 mm of activation provided by one crimp is required, replace the push rod with a longer push rod.
2. Reactivation may only be achieved on push rods sizes that have stops. Since the 22 mm push rod does not have a stop, use the 22 mm push rod to do initial advancement, and then replace it with a 25 mm push rod when there is adequate space.
3. Usually one split crimp per appointment will be needed, exclusions include non-growing patients.
4. The Forsus device can be activated unilaterally, which helps with midline control.
5. When additional activation is needed, repositioning the push rod from the cuspid to first bicuspid is also an option.

Chapter 8

Removal

Determining When the Forsus™ Fatigue Resistant Device is Ready to be Removed

The Forsus Fatigue Resistant Device is ready to be removed when:

- Buccal segments and molar relationships are Class I
- Maxillary incisors have ideal torque and position
- Overjet is eliminated

A recent study showed that Class II correction with the Forsus device will be achieved in 4-6 months.*

Tips from Dr. Lisa Alvetro

1. Mandibular incisors will rebound approximately 2-3 degrees after spring removal if using negative torque on incisor brackets.
2. Dr. Alvetro prefers slight over-correction of 1-2 mm.
3. Once the targeted amount of correction is achieved, it is recommended to keep the non-activated appliance in place for at least one appointment interval.

Slight over-correction in the buccal segments.

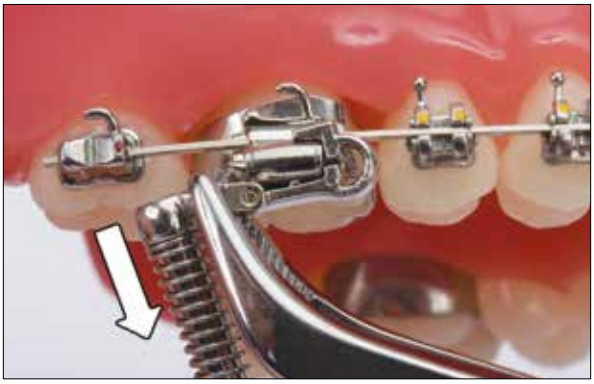
Slight over-correction.

Ideal overjet with ideal torque.

* Dr. Franchi found "the mean deviation of the FRD [Forsus™ Fatigue Resistant Device] active phase was 5.2 +/- 1.3 months". **Effectiveness of comprehensive fixed appliance treatment used with the Forsus Fatigue Resistant Device in Class II patients** Franchi, L., Alvetro, L., Giuntini, V., Masucci, C., Defraia E., & Baccetti, T. (2011) *The Angle Orthodontist,* 81(4), 678-683.

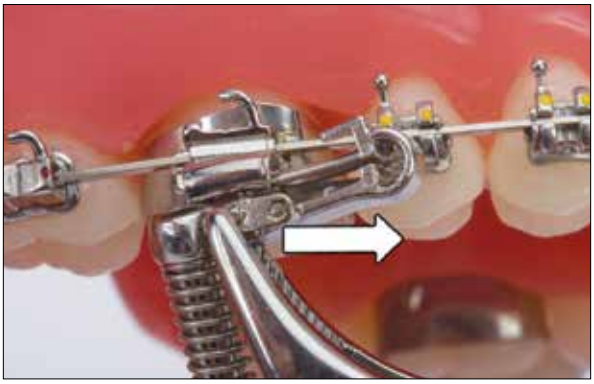
Removal Instructions

Once the Class II malocclusion is corrected, it is time to remove the Forsus device.



EZ2 Module:

1. With the patient's mouth open wide, compress the spring and remove the spring assembly from the push rod.
2. Then, holding the distal end of the Forsus EZ2 Module with a pair of Weingart pliers, pull the distal end of the clip in an occlusal then mesial direction to remove it from the headgear tube.



L-pin Module:

1. Keep the push rod and spring module engaged; have the patient bite together.
2. Using Weingart pliers, unbend the L-pin and thread it through the buccal tube; the active spring will push pin out distally.

Push Rod Removal

Once the spring module is removed, remove the push rod.

- First, rotate the push rod so that the bend is facing occlusally.

There are 3 options to remove the push rod from the archwire.

Option 1: Using a pin and ligature cutter, place the tips between where the end of the push rod is cinched and squeeze to separate.

Clinical Tip

Some clinicians dedicate and use a dull pin and ligature cutter for this removal technique.

Option 2: Grasp the distal end of the push rod with your fingers, holding the mesial loop with the Weingart pliers. Twist the loop open, away from the straight push rod, and rotate the push rod from the archwire.

Option 3: If an archwire change is planned at the current point in treatment, remove the push rod along with the current archwire.

Monitor the Results

After Removing the Forsus™ Fatigue Resistant Device Appliance

Now that the Forsus appliance has been removed, it is important to monitor the results. Keep in mind the tips below:

- If space is present after removing the Forsus Appliance, chain the arch molar to molar to close.
- If the mandibular incisors are excessively proclined, replace the archwire with a more flexible wire (e.g. Nickel Titanium) and chain the arch to upright incisors.
- To settle occlusion after Forsus Appliance removal, replace the mandibular archwire with a more flexible wire (e.g. Nickel Titanium) and prescribe box elastics to be worn at night.
- If relapse is a concern, prescribe Class II elastics as needed to prevent relapse.

Chapter 9

Case Examples

Contributing Doctors

Dr. Lisa Alvetro

After receiving her DDS summa cum laude from Ohio State University, Dr. Alvetro completed her residency at Case Western Reserve University and now lectures there as an Associate Clinical Professor teaching Practice Management. After more than 18 years of private practice in Sidney, Ohio, Dr. Alvetro continues to focus on team development, innovative products and efficient processes to sustain a quality practice.

Dr. William Vogt

Dr. Vogt has maintained a solo practice in Orthodontics in Easton, Pennsylvania since 1987. He has developed a special interest in nickel-titanium spring technology and bioengineering. Orthodontically, his special interest is in Class II mechanics. He has lectured internationally on the subject and he also holds patents on Class II correction devices, including patents on Forsus™ brand products.

He received his D.D.S. from Temple University School of Dentistry in 1981, and earned a postdoctoral certificate in Orthodontics in 1983 from the University of Buffalo (SUNY).

Case 1 – Mild Class II with Severe Crowding

Patient
Male: age 12 years, 11 months

Diagnosis
Class II Division I with severe crowding and a deep bite

Treatment Plan
- Lower lingual holding arch to preserve "e" space
- Full appliances maxillary arch – level and align, open the bite
- Full appliances mandibular arch – level and align
- Forsus™ Fatigue Resistant Device springs
- U/L finishing bends

Treatment Timeframe

Treatment Start:	05/26/2005
Forsus™ Correctors Placed:	03/13/2006
Forsus Correctors Removed (Right):	04/24/2006
Forsus Correctors Removed (Left):	06/13/2006
Forsus Correctors Duration:	3 months
Treatment End:	06/01/2007
Treatment Time:	24 months, 1 week

Treatment Sequence
- Victory Series™ Brackets
  - 14 degrees upper centrals
  - -5 degrees lower anteriors
- LLHA – 6 months
- Band upper, level and align – 3 months
- Band lower, level and align – 5 months
- Forsus Correctors (right side – 5 weeks, left side – 10 weeks)
- Class II's right only – 5 weeks and space closure – 2 months
- Artistic bends – 8 months

Initial

Initial Steiner Analysis				
Measurement	Units	Meas.	Norm	Dev.
SNA	(deg)	82.8	82.0	0.3
SNB	(deg)	78.4	80.0	-0.5
ANB	(deg)	4.4	2.0	1.2 *
Mx 1 – NA	(mm)	2.5	4.0	-0.5
Mx 1 – NA Angle	(deg)	18.9	22.0	-0.5
Md 1 – NB	(mm)	4.6	4.0	0.2
Md 1 – NB Angle	(deg)	30.8	25.0	1.0
PO – NB	(mm)	1.4	1.0	0.2
Occlusal Plane – SN	(deg)	16.2	14.0	0.6
GO-GN – SN	(deg)	27.2	32.0	-1.1 *
Interincisor Angle	(deg)	126.0	130.0	-0.7
Wits Appraisal	(mm)	1.3	1.1	0.1
Calculated ANB	(deg)	3.4	2.0	0.7
FMA	(deg)	22.6	25.0	-0.4
FMIA	(deg)	52.3	65.0	-2.1 **
IMPA	(deg)	105.1	90.0	2.5 **

Table 1: Initial Steiner analysis.

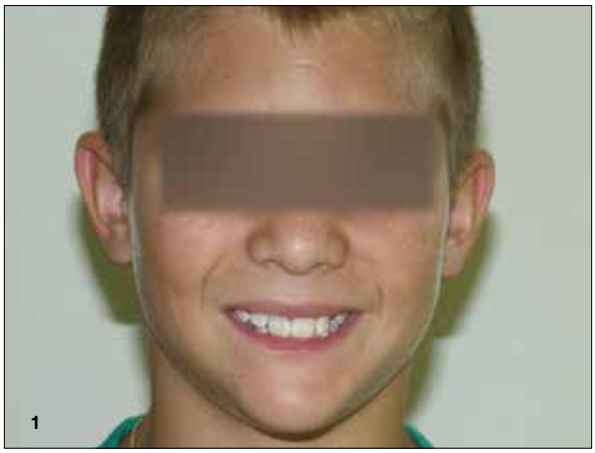


Figure 1: Initial.

Figure 2: Initial cephalometric x-ray.

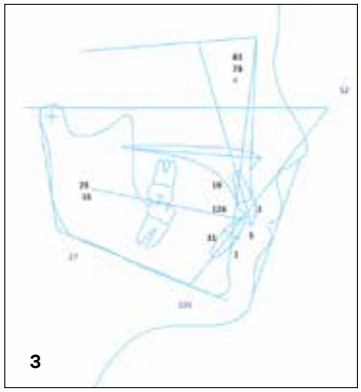
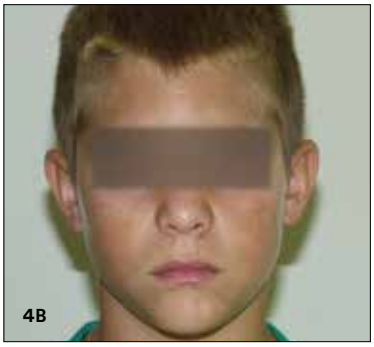


Figure 3: Initial lateral tracing.



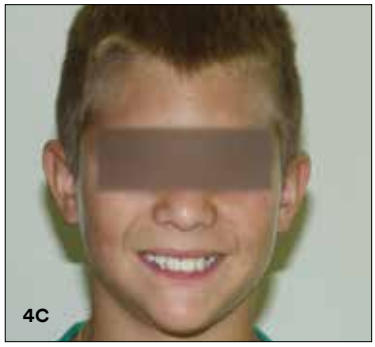


Figure 4A-H: Initial.

Forsus™ Correctors

Figure 5A-C: Forsus™ Correctors placed.

Figure 6A-B: Forsus™ Correctors removed.

Final

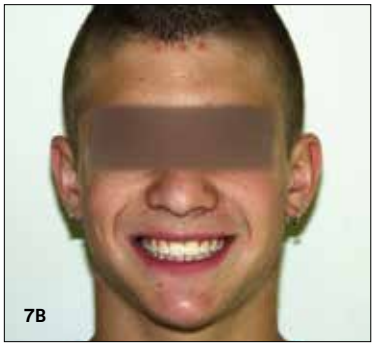


Figure 7A-E: Final.

Post Treatment

Figure 8A-C: Post treatment.

Figure 9A: Initial cephalometric x-ray.

Figure 9B: Final cephalometric x-ray.

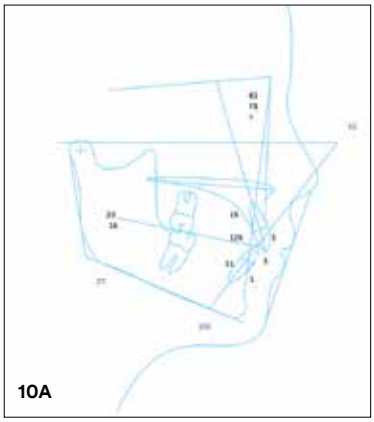


Figure 10A: Initial lateral tracing.

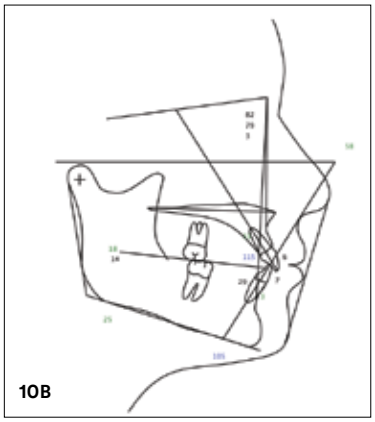


Figure 10B: Final lateral tracing.

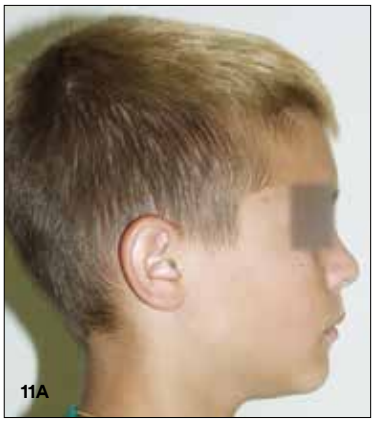


Figure 11A: Initial facial profile.

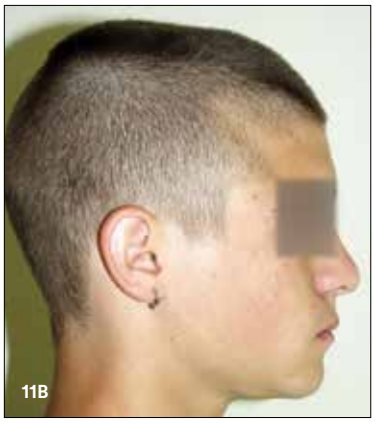


Figure 11B: Final facial profile.

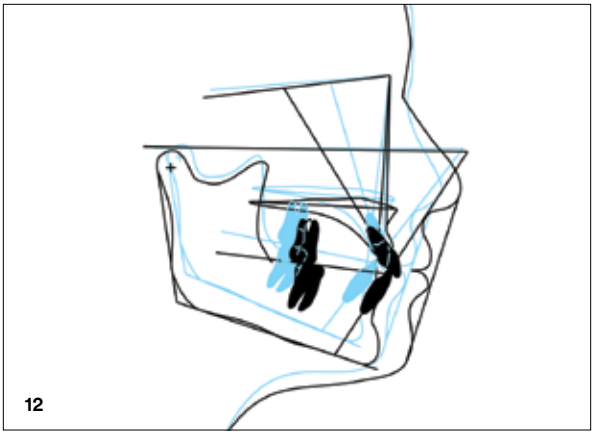


Figure 12: Superimpositions: Blue initial. Black final treatment.

Final Steiner Analysis				
Measurement	Units	Meas.	Norm	Dev.
SNA	(deg)	82.0	82.0	-0.0
SNB	(deg)	79.3	80.0	-0.2
ANB	(deg)	2.7	2.0	0.3
Mx 1 – NA	(mm)	6.4	4.0	0.8
Mx 1 – NA Angle	(deg)	32.6	22.0	1.8 *
Md 1 – NB	(mm)	6.7	4.0	0.9
Md 1 – NB Angle	(deg)	29.3	25.0	0.7
PO – NB	(mm)	3.0	1.0	1.1 *
Occlusal Plane – SN	(deg)	13.8	14.0	-0.0
GO-GN – SN	(deg)	25.2	32.0	-1.5 *
Interincisor Angle	(deg)	115.5	130.0	-2.4 **
Wits Appraisal	(mm)	1.1	1.1	0.0
Calculated ANB	(deg)	2.7	2.0	0.3
FMA	(deg)	17.6	25.0	-1.2 *
FMIA	(deg)	57.7	65.0	-1.2 *
IMPA	(deg)	104.7	90.0	2.5 **

Table 2: Final Steiner analysis.

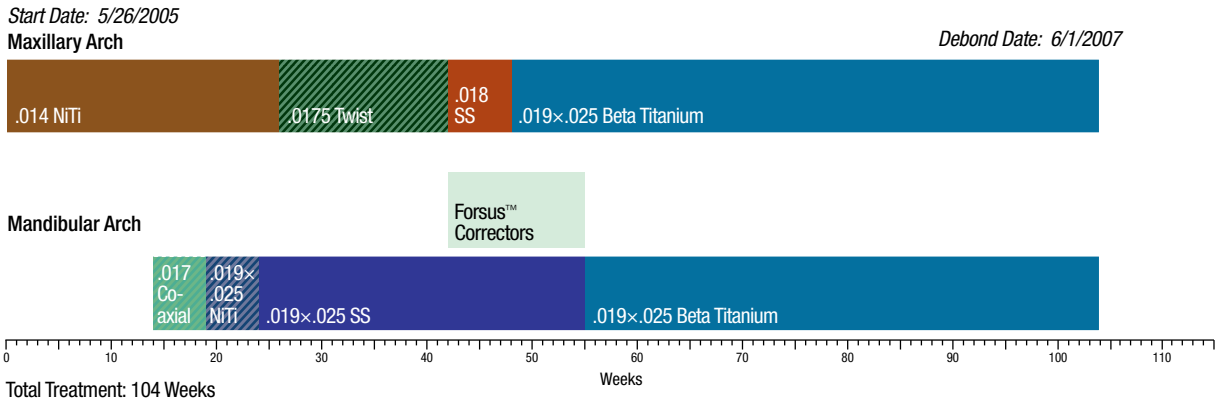


Figure 13: Treatment Timeline and Archwire Sequence.

Case 2 – Moderate Class II with Overbite

Patient
Female: age 11 years 4 months

Diagnosis
Class II Malocclusion

- Moderate overbite
- Mild overjet
- Mandibular retrognathic

Treatment Timeframe

Treatment Start:	09/01/2004
Forsus™ Correctors Placed:	12/12/2005
Forsus Correctors Removed:	05/10/2006
Forsus Correctors Duration:	5 months
Treatment End:	09/19/2006
Treatment Time:	24 months, 2 weeks

Treatment Plan
- .022 slot Victory Series™ Brackets, MBT™ Appliance System Rx with -6 degrees of torque in mandibular incisors
- Forsus™ Fatigue Resistant Device to correct Class II relationship
- Maxillary archwire will be cinched distal to the maxillary molars

Initial

Initial ABO Analysis				
Maxilla to Cranial Base				
SNA (°)	78.1	82.0	3.5	-1.1 *
Mandible to Cranial Base				
SNB (°)	73.8	80.9	3.4	-2.1 **
SN – GoGn (°)	29.0	32.9	5.2	-0.8
FMA (MP-FH) (°)	19.7	25.2	4.5	-1.2 *
Maxillo-Mandibular				
ANB (°)	4.3	1.6	1.5	1.8 *
Maxillary Dentition				
U1 – NA (mm)	4.4	4.3	2.7	0.0
U1 – SN (°)	101.4	102.4	5.5	-0.2
Mandibular Dentition				
L1 – NB (mm)	3.1	4.0	1.8	-0.5
L1 – GoGn (°)	102.3	93.0	6.0	1.6 *
Soft Tissue				
Lower Lip to E-Plane (mm)	-3.2	-2.0	2.0	-0.6
Upper Lip to E-Plane (mm)	-4.2	-3.4	2.0	-0.4

Table 1: Initial ABO analysis.

Figure 1: Initial.

Figure 2: Initial cephalometric x-ray.

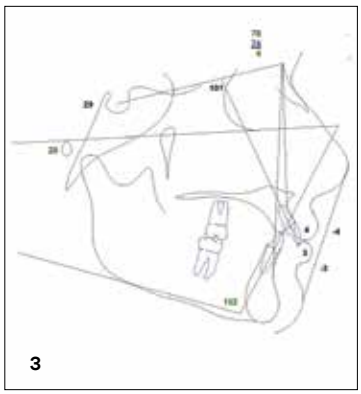
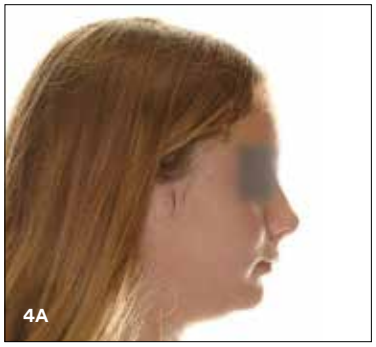


Figure 3: Initial lateral tracing.



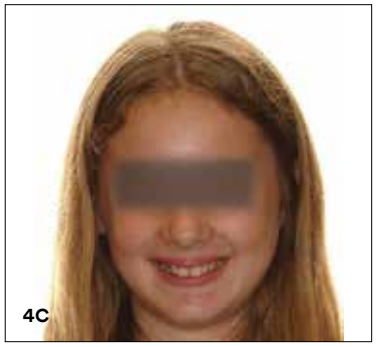


Figure 4A-H: Initial.

Final

Figure 5A-H: Final.

Figure 6A: Initial cephalometric x-ray.

Figure 6B: Final cephalometric x-ray.

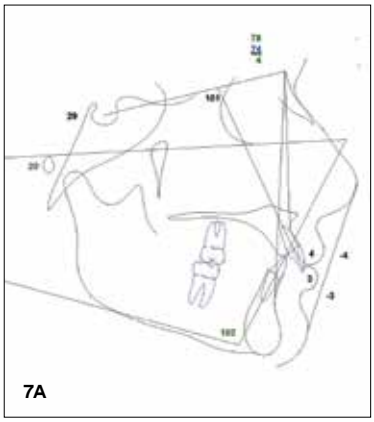


Figure 7A: Initial lateral tracing.

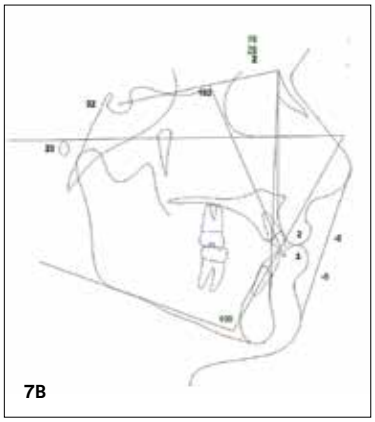


Figure 7B: Final lateral tracing.

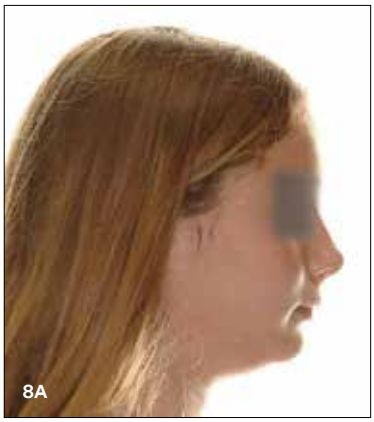


Figure 8A: Initial facial profile.

Figure 8B: Final facial profile.

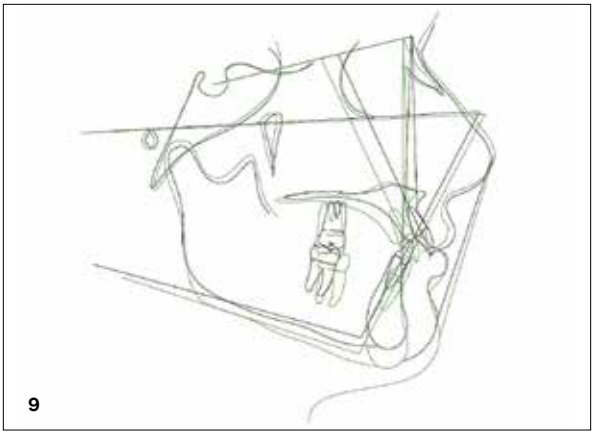


Figure 9: Superimpositions: Black initial. Green final treatment.

Final ABO Analysis				
Maxilla to Cranial Base				
SNA (°)	78.0	82.0	3.5	-1.1 *
Mandible to Cranial Base				
SNB (°)	75.9	80.9	3.4	-1.5 *
SN – GoGn (°)	31.6	32.9	5.2	-0.3
FMA (MP-FH) (°)	23.0	24.3	4.5	-0.3
Maxillo-Mandibular				
ANB (°)	2.1	1.6	1.5	0.3
Maxillary Dentition				
U1 – NA (mm)	2.4	4.3	2.7	-0.7
U1 – SN (°)	101.6	102.7	5.5	-0.2
Mandibular Dentition				
L1 – NB (mm)	2.7	4.0	1.8	-0.7
L1 – GoGn (°)	99.8	93.0	6.0	1.1 *
Soft Tissue				
Lower Lip to E-Plane (mm)	-4.6	-2.0	2.0	-1.3 *
Upper Lip to E-Plane (mm)	-8.1	-5.2	2.0	-1.4 *

Table 2: Final ABO analysis.

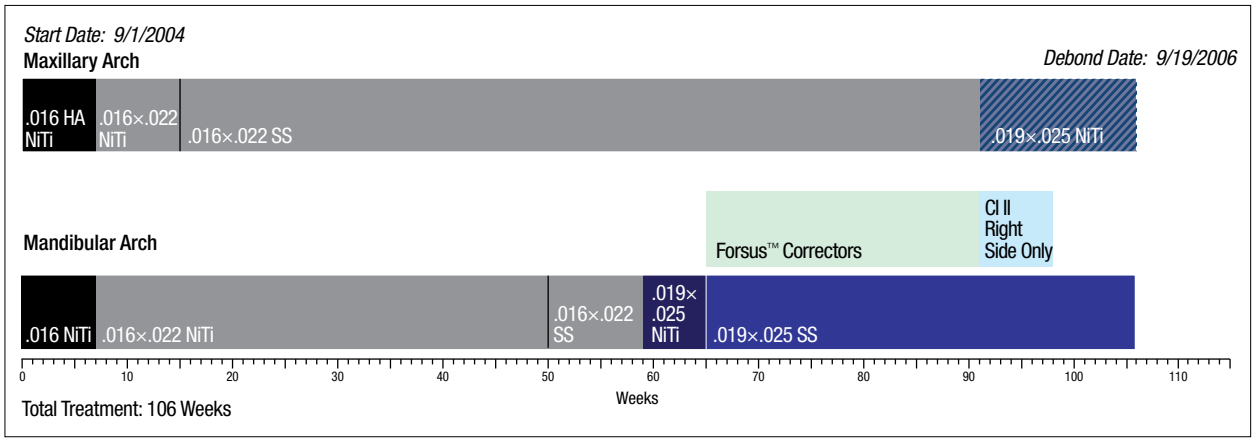


Figure 10: Treatment Timeline and Archwire Sequence.

Case 3 – Severe Class II with Maxillary Mild Crowding

Patient
Female: age 13 years, 1 month

Diagnosis
- Class II Division I, maxillary mild crowding, mandibular spacing, deep bite
- Posterior right crossbite

Treatment Plan
- Victory Series™ Brackets
  - 14 degrees maxillary 1's
  - -5 degrees mandibular anteriors
- Rapid palatal expander
- Full banding
- Level and align arches
- Lower space closure
- Forsus™ Fatigue Resistant Device
- Upper space closure
- Finishing and Class II elastics if needed

Treatment Timeframe

Treatment Start:	01/21/2008
Forsus™ Correctors Placed:	12/12/2008
Forsus Correctors Removed:	08/20/2009
Forsus Correctors Duration:	8 months, 1 week
Treatment End:	10/14/2010
Treatment Time:	32 months, 3 weeks

Treatment Sequence
- Rapid palatal expansion followed by Quad-helix for retention – 9 months
- Full appliances placed – leveled and aligned – closed lower spaces – 5 months
- Forsus Correctors – 6 months
- Upper spaces closure, Class II elastics – 2 months
- Artistic bends – 12 months

Initial

Initial Steiner Analysis				
Measurement	Units	Meas.	Norm	Dev.
SNA	(deg)	88.4	82.0	2.1 **
SNB	(deg)	82.5	80.0	0.8
ANB	(deg)	6.0	2.0	2.0 *
Mx 1 – NA	(mm)	6.0	4.0	0.7
Mx 1 – NA Angle	(deg)	27.1	22.0	0.9
Md 1 – NB	(mm)	5.6	4.0	0.5
Md 1 – NB Angle	(deg)	26.7	25.0	0.3
PO – NB	(mm)	1.2	1.0	0.1
Occlusal Plane – SN	(deg)	15.3	14.0	0.4
GO-GN – SN	(deg)	26.8	32.0	-1.2 *
Interincisor Angle	(deg)	120.2	130.0	-1.6 *
Wits Appraisal	(mm)	2.1	1.1	0.5
Calculated ANB	(deg)	5.6	2.0	1.8 *
FMA	(deg)	26.4	25.0	0.2
FMIA	(deg)	56.2	65.0	-1.5 *
IMPA	(deg)	97.4	90.0	1.2 *

Table 1: Initial Steiner analysis.

Figure 1: Initial.

Figure 2: Initial cephalometric x-ray.

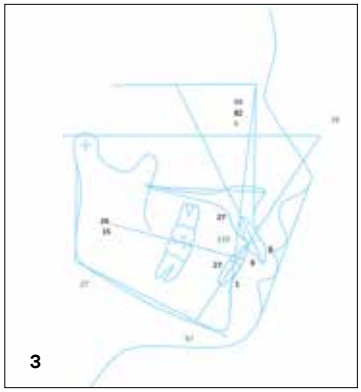


Figure 3: Initial lateral tracing.

Figure 4A-H: Initial.

Forsus™ Correctors

Figure 5A-C: Forsus™ Correctors placed.

Figure 6A-C: Forsus™ Correctors removed.

Final

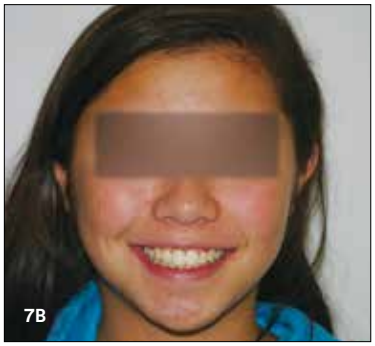


Figure 7A-E: Final.

Figure 8A: Initial cephalometric x-ray.

Figure 8B: Final cephalometric x-ray.

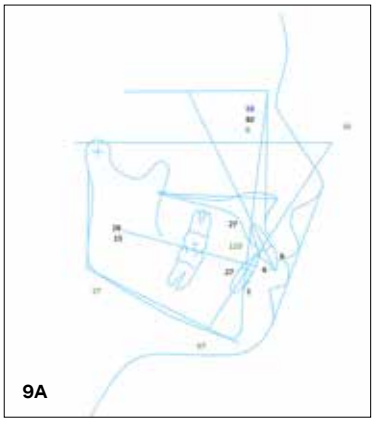


Figure 9A: Initial lateral tracing.

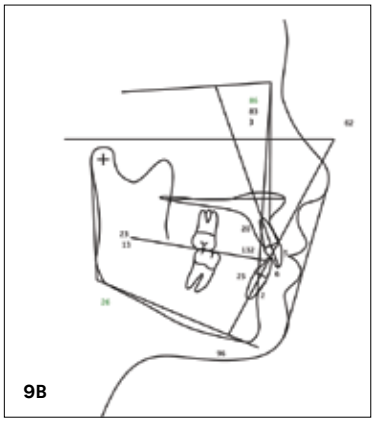


Figure 9B: Final lateral tracing.

Figure 10A: Initial facial profile.

Figure 10B: Final facial profile.

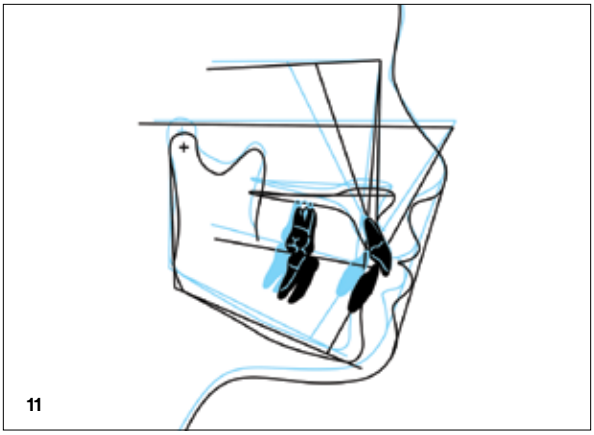


Figure 11: Superimpositions: Blue initial. Black final treatment.

Final Steiner Analysis				
Measurement	Units	Meas.	Norm	Dev.
SNA	(deg)	85.6	82.0	1.2 *
SNB	(deg)	82.5	80.0	0.8
ANB	(deg)	3.1	2.0	0.6
Mx 1 – NA	(mm)	5.4	4.0	0.5
Mx 1 – NA Angle	(deg)	19.8	22.0	-0.4
Md 1 – NB	(mm)	5.7	4.0	0.6
Md 1 – NB Angle	(deg)	24.6	25.0	-0.1
PO – NB	(mm)	1.9	1.0	0.5
Occlusal Plane – SN	(deg)	13.3	14.0	-0.2
GO-GN – SN	(deg)	26.4	32.0	-1.2 *
Interincisor Angle	(deg)	132.4	130.0	0.4
Wits Appraisal	(mm)	-0.1	1.1	-0.6
Calculated ANB	(deg)	4.4	2.0	1.2 *
FMA	(deg)	22.7	25.0	-0.4
FMIA	(deg)	61.6	65.0	-0.6
IMPA	(deg)	95.7	90.0	0.9

Table 2: Final Steiner analysis.

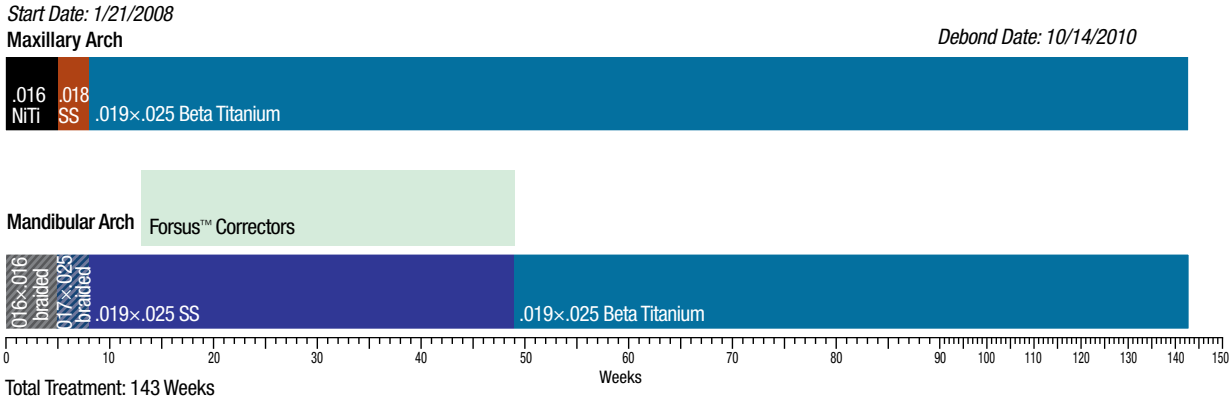


Figure 12: Treatment Timeline and Archwire Sequence.

Case 4 – Severe Overbite

Patient
Female: age 14 years, 1 month

Diagnosis
Class II malocclusion

- Severe overbite
- Moderate overjet
- Mild mandibular crowding
- Moderate maxillary crowding

Treatment Timeframe

Treatment Start:	01/19/2009
Forsus™ Correctors Placed:	01/3/2010
Forsus Correctors Removed:	06/14/2010
Forsus Correctors Duration:	5 months, 2 weeks
Treatment End:	02/10/11
Treatment Time:	24 months, 3 weeks

Treatment Plan
- .022 slot SmartClip™ Self-Ligating Brackets, MBT™ Appliance System Rx with -6 degrees of torque in mandibular incisors
- Forsus™ Fatigue Resistant Device to correct Class II relationship and aid in bite opening in the mandibular arch
- Maxillary arch will be chained molar to molar while the Forsus Appliance is in place

Initial

Initial ABO Analysis				
Maxilla to Cranial Base				
SNA (°)	81.4	82.0	3.5	-0.2
Mandible to Cranial Base				
SNB (°)	75.9	80.9	3.4	-1.5 *
SN – GoGn (°)	23.6	32.9	5.2	-1.8 *
FMA (MP-FH) (°)	20.7	24.2	4.5	-0.8
Maxillo-Mandibular				
ANB (°)	5.5	1.6	1.5	2.6 **
Maxillary Dentition				
U1 – NA (mm)	-0.6	4.3	2.7	-1.8 *
U1 – SN (°)	85.9	102.7	5.5	-3.1 ***
Mandibular Dentition				
L1 – NB (mm)	2.5	4.0	1.8	-0.9
L1 – GoGn (°)	92.4	93.0	6.0	-0.1
Soft Tissue				
Lower Lip to E-Plane (mm)	-3.8	-2.0	2.0	-0.9
Upper Lip to E-Plane (mm)	-5.5	-5.3	2.0	-0.1

Table 1: Initial ABO analysis.

Figure 1: Initial.

Figure 2: Initial cephalometric x-ray.

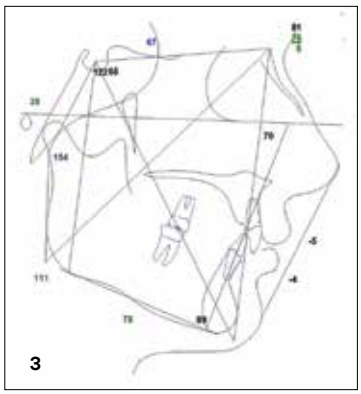


Figure 3: Initial lateral tracing.

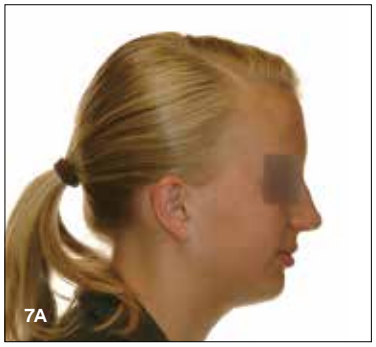
Figure 4A-H: Initial.

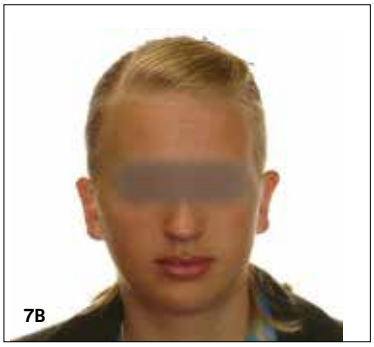
Forsus™ Correctors

Figure 5A-F: Forsus™ Correctors placed.

Figure 6A-E: Forsus™ Correctors removed.

Final





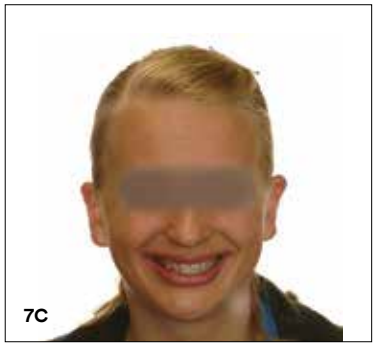


Figure 7A-H: Final.

Figure 8A: Initial cephalometric x-ray.

Figure 8B: Final cephalometric x-ray.

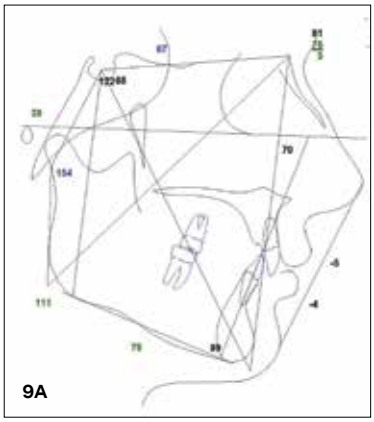


Figure 9A: Initial lateral tracing.

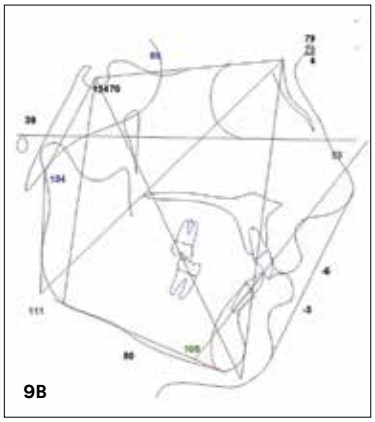


Figure 9B: Final lateral tracing.

Figure 10A: Initial facial profile.

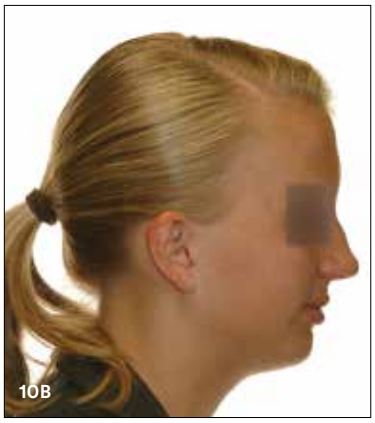


Figure 10B: Final facial profile.

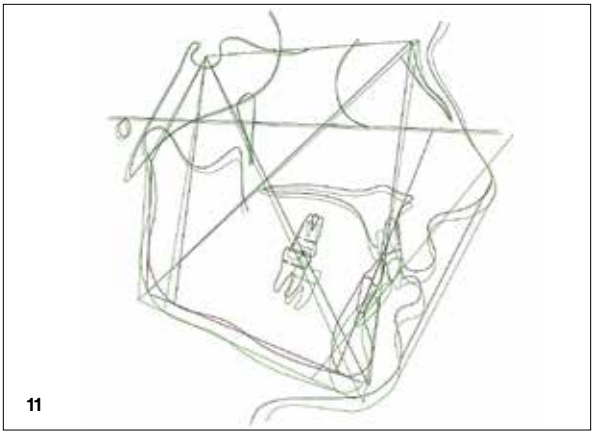


Figure 11: Superimpositions: Black initial. Green final treatment.

Final ABO Analysis				
Maxilla to Cranial Base				
SNA (°)	78.7	82.0	3.5	-0.9
Mandible to Cranial Base				
SNB (°)	74.7	80.9	3.4	-1.8 *
SN – GoGn (°)	25.3	32.9	5.2	-1.5 *
FMA (MP-FH) (°)	22.4	23.4	4.5	-0.2
Maxillo-Mandibular				
ANB (°)	4.0	1.6	1.5	1.6 *
Maxillary Dentition				
U1 – NA (mm)	3.1	4.3	2.7	-0.4
U1 – SN (°)	102.7	102.9	5.5	-0.0
Mandibular Dentition				
L1 – NB (mm)	6.3	4.0	1.8	1.3 *
L1 – GoGn (°)	108.4	93.0	6.0	2.6 **
Soft Tissue				
Lower Lip to E-Plane (mm)	-3.0	-2.0	2.0	-0.5
Upper Lip to E-Plane (mm)	-6.3	-6.9	2.0	0.3

Table 2: Final ABO analysis.

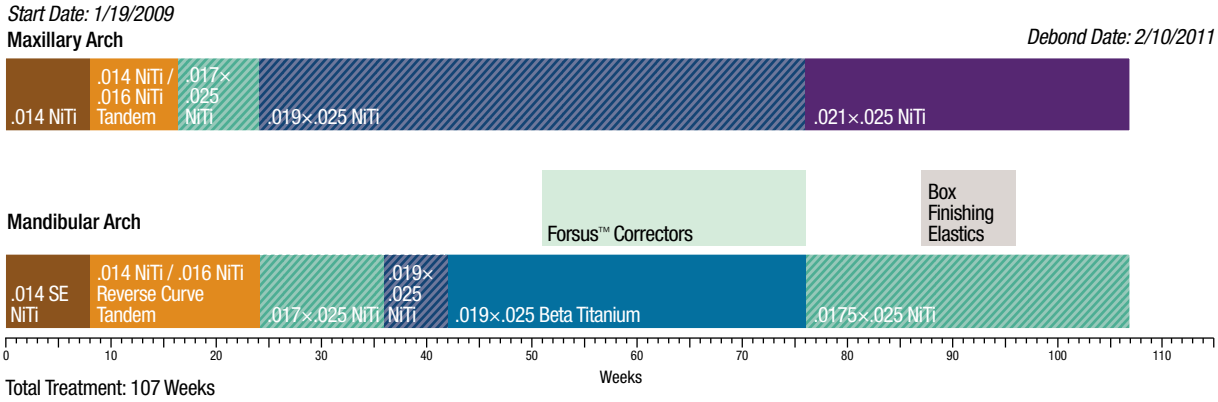


Figure 12: Treatment Timeline and Archwire Sequence.

Case 5 – Anterior Open Bite

Patient
Female: age 13 years 8 months

Diagnosis
Class II malocclusion

- Mild Class II relationship
- Anterior open bite
- Mild mandibular crowding
- Mild maxillary crowding

Treatment Timeframe

Treatment Start:	07/18/2008
Forsus™ Correctors Placed:	08/20/2009
Forsus Correctors Removed:	03/15/2009
Forsus Correctors Duration:	7 months
Treatment End:	09/16/2010
Treatment Time:	26 months

Treatment Plan
- .022 slot SmartClip™ Self-Ligating Brackets, MBT™ Appliance System Rx with -6 degrees of torque in mandibular incisors
- Extract maxillary first bicuspids
- Extract mandibular second bicuspids
- Forsus™ Fatigue Resistant Device to correct Class II relationship and act as anchorage during extraction space closure
- Gingival headgear tube with L-pin spring module

Initial

Initial ABO Analysis					
Maxilla to Cranial Base					
SNA (°)	80.2	82.0	3.5	-0.5	
Mandible to Cranial Base					
SNB (°)	75.1	80.9	3.4	-1.7	*
SN – GoGn (°)	34.3	32.9	5.2	0.3	
FMA (MP-FH) (°)	25.3	24.5	4.5	0.2	
Maxillo-Mandibular					
ANB (°)	5.1	1.6	1.5	2.4	**
Maxillary Dentition					
U1 – NA (mm)	3.0	4.3	2.7	-0.5	
U1 – SN (°)	96.8	102.6	5.5	-1.0	*
Mandibular Dentition					
L1 – NB (mm)	1.2	4.0	1.8	-1.6	*
L1 – GoGn (°)	87.1	93.0	6.0	-1.0	*
Soft Tissue					
Lower Lip to E-Plane (mm)	-3.0	-2.0	2.0	-0.5	
Upper Lip to E-Plane (mm)	-2.7	-4.7	2.0	1.0	*

Table 1: Initial ABO analysis.

Figure 1: Initial.

Figure 2: Initial cephalometric x-ray.

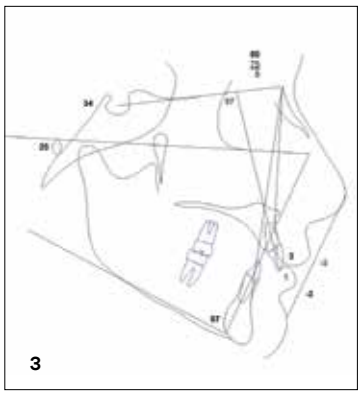


Figure 3: Initial lateral tracing.

Figure 4A-H: Initial.

Final

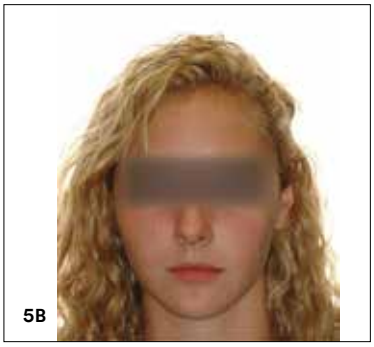


Figure 5A-H: Final.

Figure 6A: Initial cephalometric x-ray.

Figure 6B: Final cephalometric x-ray.

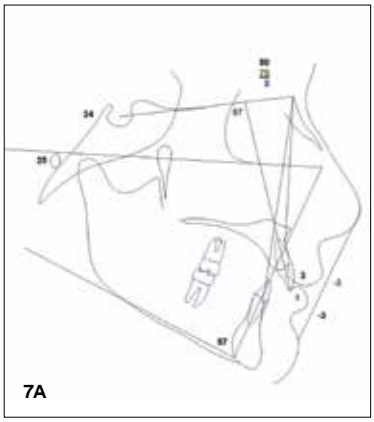


Figure 7A: Initial lateral tracing.

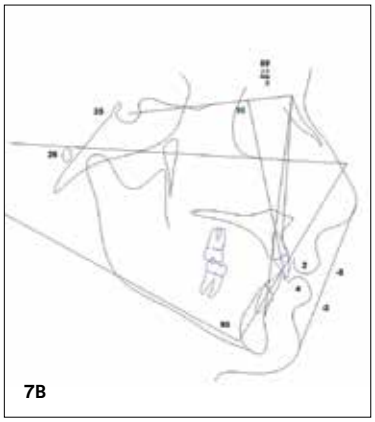


Figure 7B: Final lateral tracing.

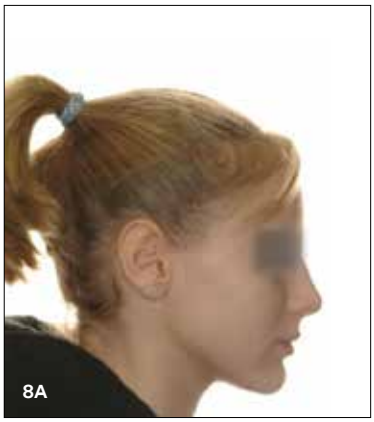


Figure 8A: Initial facial profile.

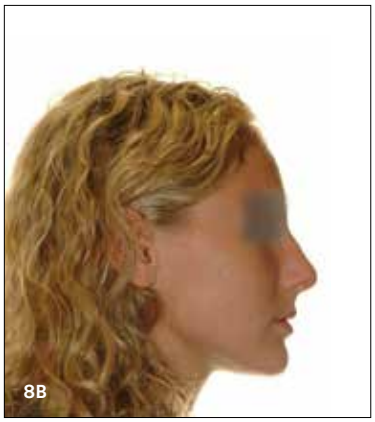


Figure 8B: Final facial profile.

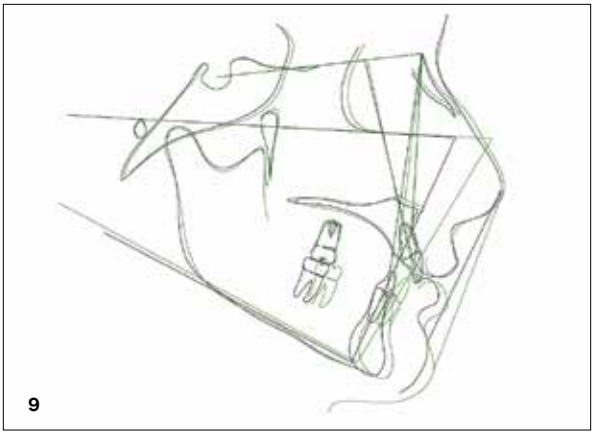


Figure 9: Superimpositions: Black initial. Green final treatment.

Final ABO Analysis				
Maxilla to Cranial Base				
SNA (°)	79.9	82.0	3.5	-0.6
Mandible to Cranial Base				
SNB (°)	76.6	80.9	3.4	-1.3 *
SN – GoGn (°)	34.8	32.9	5.2	0.4
FMA (MP-FH) (°)	26.0	23.9	4.5	0.5
Maxillo-Mandibular				
ANB (°)	3.3	1.6	1.5	1.1 *
Maxillary Dentition				
U1 – NA (mm)	2.3	4.3	2.7	-0.7
U1 – SN (°)	95.6	102.8	5.5	-1.3 *
Mandibular Dentition				
L1 – NB (mm)	4.1	4.0	1.8	0.1
L1 – GoGn (°)	92.8	93.0	6.0	-0.0
Soft Tissue				
Lower Lip to E-Plane (mm)	-3.4	-2.0	2.0	-0.7
Upper Lip to E-Plane (mm)	-5.3	-6.0	2.0	0.3

Table 2: Final ABO analysis.

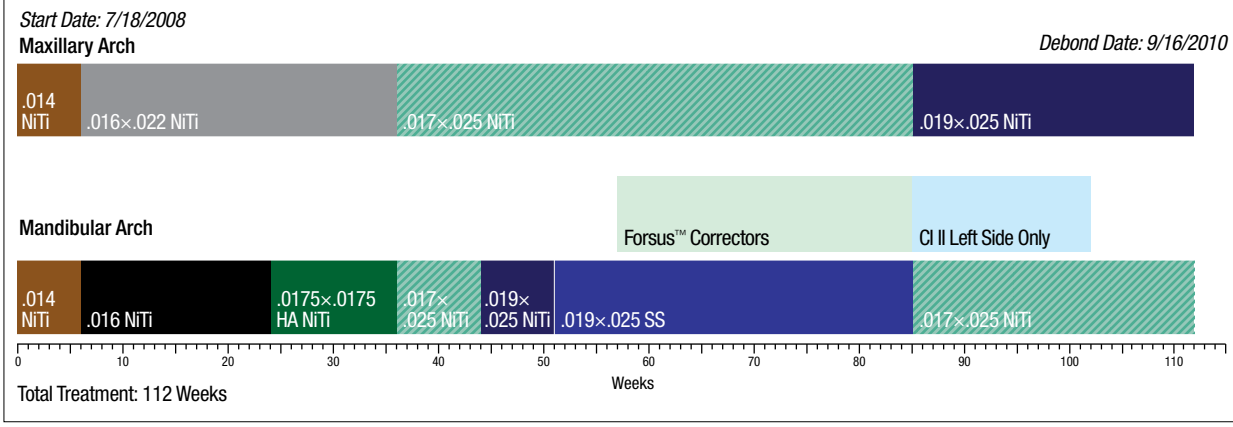


Figure 10: Treatment Timeline and Archwire Sequence.

Case 6 – Maxillary Midline Correction

Patient
Male: age 14 years, 2 months

Diagnosis
Unilateral Class II malocclusion

- Class II relationship on the right side
- Class I relationship on the left side
- Maxillary midline deviated to the left
- Moderate overjet
- Mild maxillary crowding
- Mild mandibular crowding

Treatment Timeframe

Treatment Start:	08/30/2006
Forsus™ Correctors Placed:	06/28/2007
Forsus Correctors Removed:	11/13/2007
Forsus Correctors Duration:	4 months, 2 weeks
Treatment End:	10/06/2008
Treatment Time:	25 months, 1 week

Treatment Plan
- .022 slot SmartClip™ Self-Ligating Brackets, MBT™ Appliance System Rx with -6 degrees of torque in mandibular incisors
- Forsus™ Fatigue Resistant Device to correct Class II relationship and as a unilateral distalization appliance
- Forsus Corrector placed active on the right and activated until correction of Class II relationship is completed
- Forsus Corrector placed non-activated on the left side
- Maxillary archwire will be cinched distal to the maxillary molar on the left side
- Maxillary archwire will be left uncinched and slightly long on right side to allow for distalization of the right buccal segment

Initial

Initial ABO Analysis				
Maxilla to Cranial Base				
SNA (°)	80.8	82.0	3.5	-0.4
Mandible to Cranial Base				
SNB (°)	76.3	80.9	3.4	-1.4 *
SN – GoGn (°)	25.0	32.9	5.2	-1.5 *
FMA (MP-FH) (°)	18.2	24.2	4.5	-1.3 *
Maxillo-Mandibular				
ANB (°)	4.5	1.6	1.5	1.9 *
Maxillary Dentition				
U1 – NA (mm)	1.6	4.3	2.7	-1.0 *
U1 – SN (°)	96.6	102.7	5.5	-1.1 *
Mandibular Dentition				
L1 – NB (mm)	2.5	4.0	1.8	-0.8
L1 – GoGn (°)	104.3	93.0	6.0	1.9 *
Soft Tissue				
Lower Lip to E-Plane (mm)	-4.7	-2.0	2.0	-1.3 *
Upper Lip to E-Plane (mm)	-3.5	-5.4	2.0	1.0 *

Table 1: Initial ABO analysis.

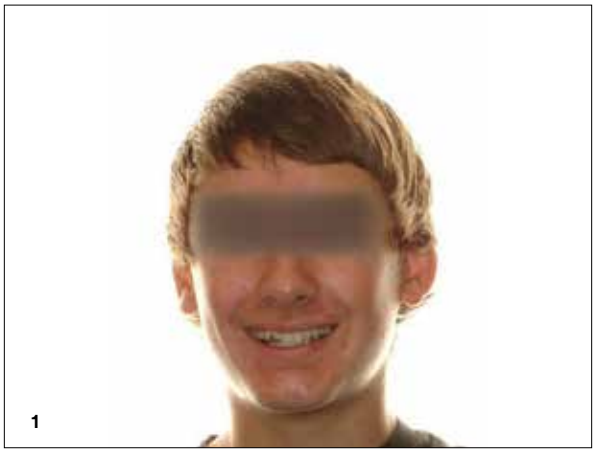
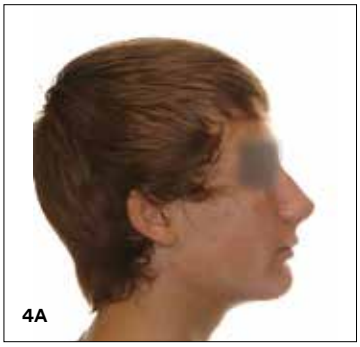
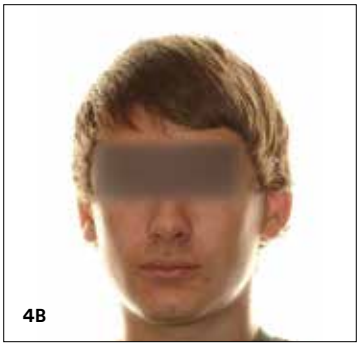


Figure 1: Initial.

Figure 2: Initial cephalometric x-ray.

Figure 3: Initial lateral tracing.





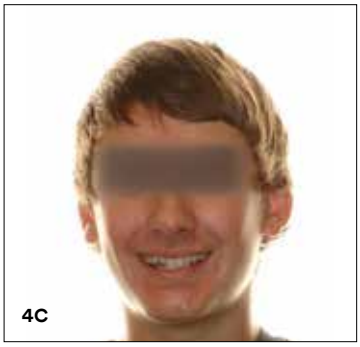
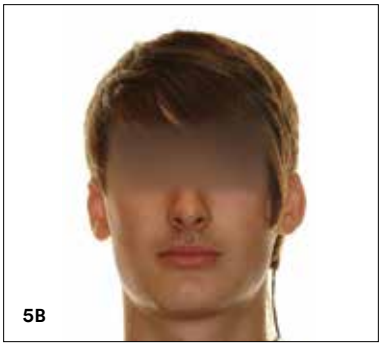


Figure 4A-H: Initial.

Final



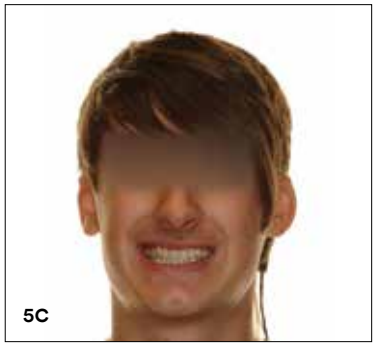


Figure 5A-H: Final.

Figure 6A: Initial cephalometric x-ray.

Figure 6B: Final cephalometric x-ray.

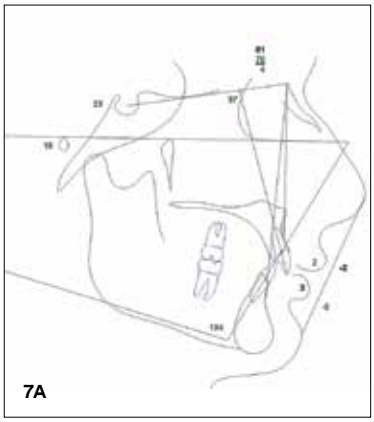


Figure 7A: Initial lateral tracing.

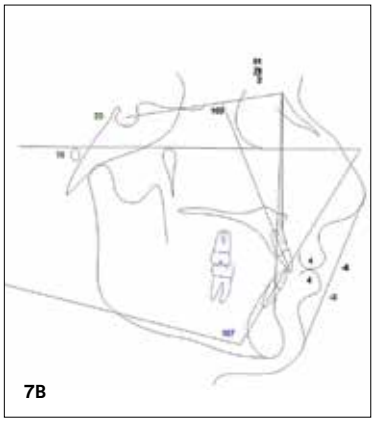


Figure 7B: Final lateral tracing.

Figure 8A: Initial facial profile.

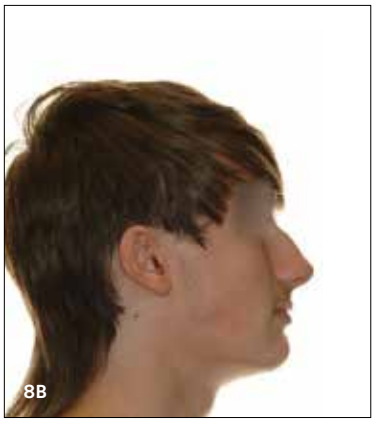


Figure 8B: Final facial profile.

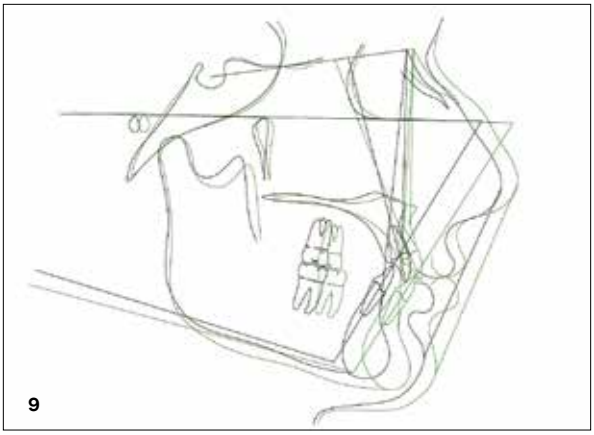


Figure 9: Superimpositions: Black initial. Green final treatment.

Final ABO Analysis				
Maxilla to Cranial Base				
SNA (°)	81.1	82.0	3.5	-0.3
Mandible to Cranial Base				
SNB (°)	79.0	80.9	3.4	-0.5
SN – GoGn (°)	23.0	32.9	5.2	-1.9 *
FMA (MP-FH) (°)	15.9	23.2	4.5	-1.6 *
Maxillo-Mandibular				
ANB (°)	2.0	1.6	1.5	0.3
Maxillary Dentition				
U1 – NA (mm)	3.6	4.3	2.7	-0.3
U1 – SN (°)	103.2	103.0	5.5	0.0
Mandibular Dentition				
L1 – NB (mm)	4.4	4.0	1.8	0.2
L1 – GoGn (°)	107.5	93.0	6.0	2.4 **
Soft Tissue				
Lower Lip to E-Plane (mm)	-2.6	-2.0	2.0	-0.3
Upper Lip to E-Plane (mm)	-5.5	-7.4	2.0	0.9

Table 2: Final ABO analysis.

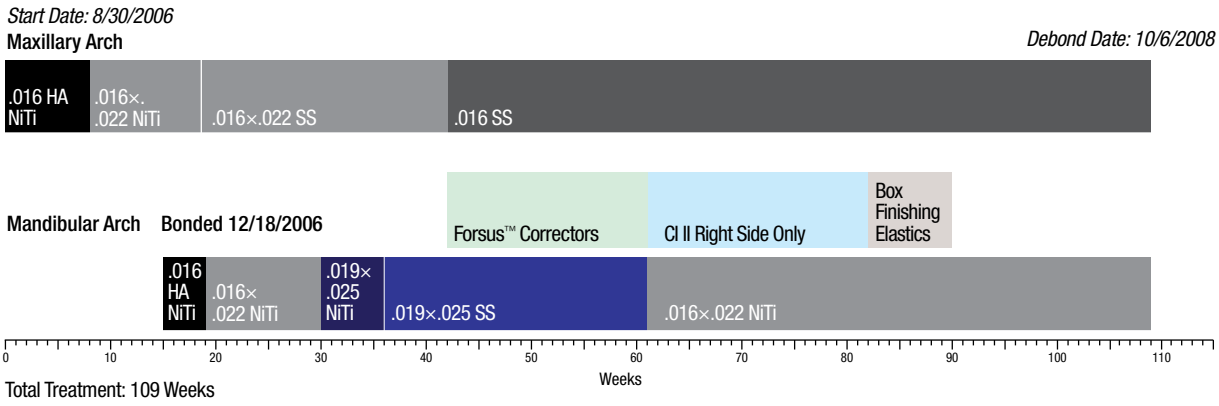


Figure 10: Treatment Timeline and Archwire Sequence.

Case 7 – Unilateral Class II

Patient
Male: age 16 years, 8 months

Diagnosis
Unilateral Class II malocclusion

- 100% overbite
- Class I relationship on the right side
- Class II relationship on the left side
- Maxillary midline coincident with facial midline
- Mandibular midline deviated to the left
- Moderate overjet
- Mild mandibular crowding
- Moderate maxillary crowding

Treatment Timeframe

Treatment Start:	05/27/2008
Forsus™ Correctors Placed:	04/20/2009
Forsus Correctors Removed:	10/21/2009
Forsus Correctors Duration:	6 months
Treatment End:	07/01/2010
Treatment Time:	25 months, 1 week

Treatment Plan
- .022 slot SmartClip™ Self-Ligating Brackets, MBT™ Appliance System Rx with -6 degrees of torque in mandibular incisors
- Mandibular archwire will have bite opening curve placed when inserted
- Forsus™ Fatigue Resistant Device to correct Class II relationship
- Forsus Corrector placed active on the left side and activated until correction of Class II relationship is completed
- Forsus Corrector placed non-activated on the right side
- Maxillary archwire will be cinched distal to the maxillary molars

Initial

Initial ABO Analysis					
Maxilla to Cranial Base					
SNA (°)	86.4	82.0	3.5	1.2	*
Mandible to Cranial Base					
SNB (°)	80.1	80.9	3.4	-0.2	
SN – GoGn (°)	19.4	32.9	5.2	-2.6	**
FMA (MP-FH) (°)	13.7	23.7	4.5	-2.2	**
Maxillo-Mandibular					
ANB (°)	6.3	1.6	1.5	3.1	***
Maxillary Dentition					
U1 – NA (mm)	-1.1	4.3	2.7	-2.0	**
U1 – SN (°)	89.4	102.9	5.5	-2.5	**
Mandibular Dentition					
L1 – NB (mm)	1.3	4.0	1.8	-1.5	*
L1 – GoGn (°)	96.6	93.0	6.0	0.6	
Soft Tissue					
Lower Lip to E-Plane (mm)	-1.1	-2.0	2.0	0.5	
Upper Lip to E-Plane (mm)	0.0	-6.4	2.0	3.2	***

Table 1: Initial ABO analysis.

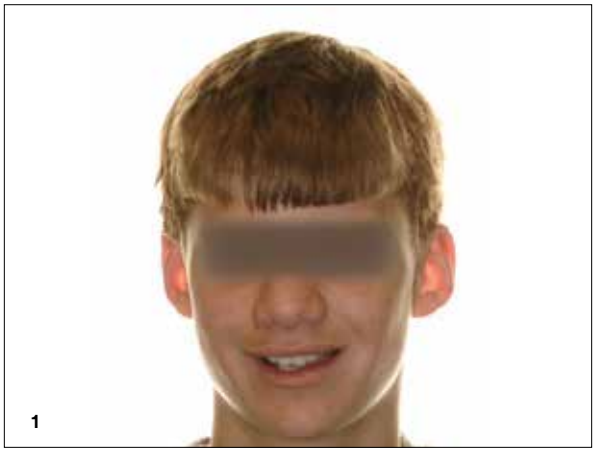
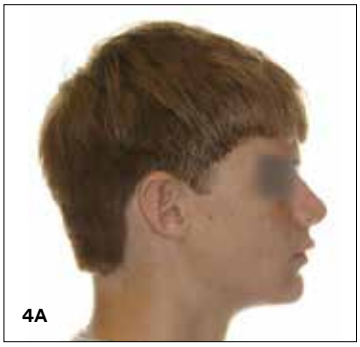
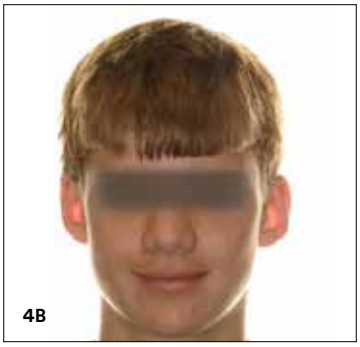


Figure 1: Initial.

Figure 2: Initial cephalometric x-ray.

Figure 3: Initial lateral tracing.





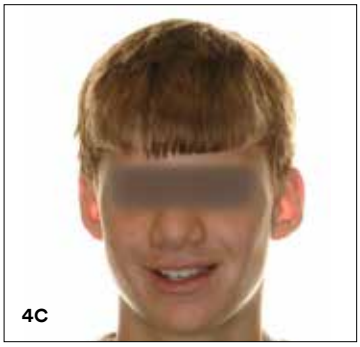
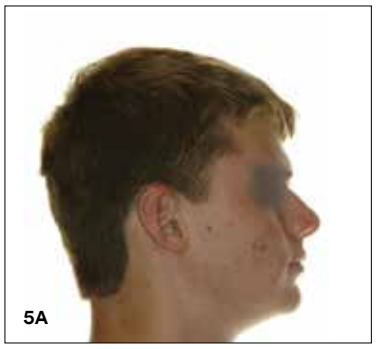
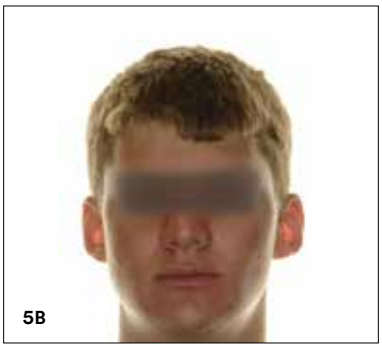


Figure 4A-H: Initial.

Final





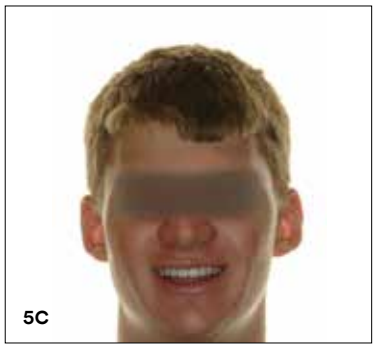


Figure 5A-H: Final.

Figure 6A: Initial cephalometric x-ray.

Figure 6B: Final cephalometric x-ray.

Figure 7A: Initial lateral tracing.

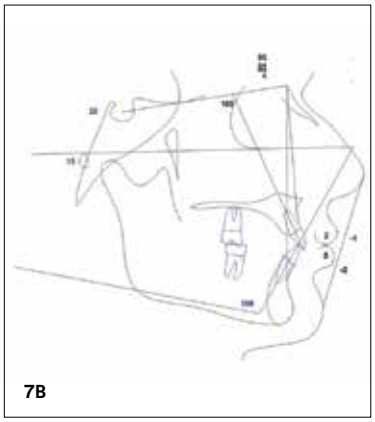


Figure 7B: Final lateral tracing.

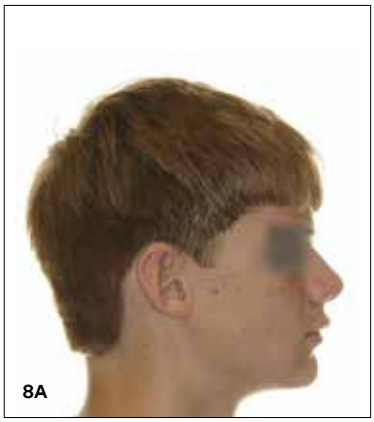


Figure 8A: Initial facial profile.

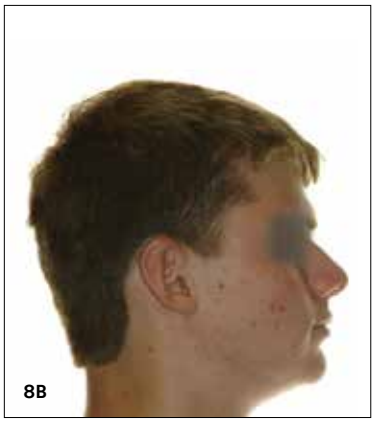


Figure 8B: Final facial profile.

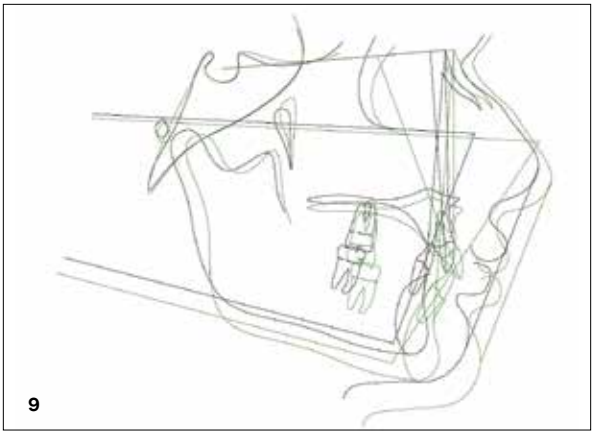


Figure 9: Superimpositions: Black initial. Green final treatment.

Final ABO Analysis					
Maxilla to Cranial Base					
SNA (°)	85.3	82.0	3.5	0.9	
Mandible to Cranial Base					
SNB (°)	81.0	80.9	3.4	0.0	
SN – GoGn (°)	19.9	32.9	5.2	-2.5	**
FMA (MP-FH) (°)	15.1	23.0	4.5	-1.7	*
Maxillo-Mandibular					
ANB (°)	4.3	1.6	1.5	1.8	*
Maxillary Dentition					
U1 – NA (mm)	1.8	4.3	2.7	-0.9	
U1 – SN (°)	105.5	103.1	5.5	0.4	
Mandibular Dentition					
L1 – NB (mm)	4.9	4.0	1.8	0.5	
L1 – GoGn (°)	108.7	93.0	6.0	2.6	**
Soft Tissue					
Lower Lip to E-Plane (mm)	-2.0	-2.0	2.0	-0.0	
Upper Lip to E-Plane (mm)	-3.9	-7.8	2.0	2.0	**

Table 2: Final ABO analysis.

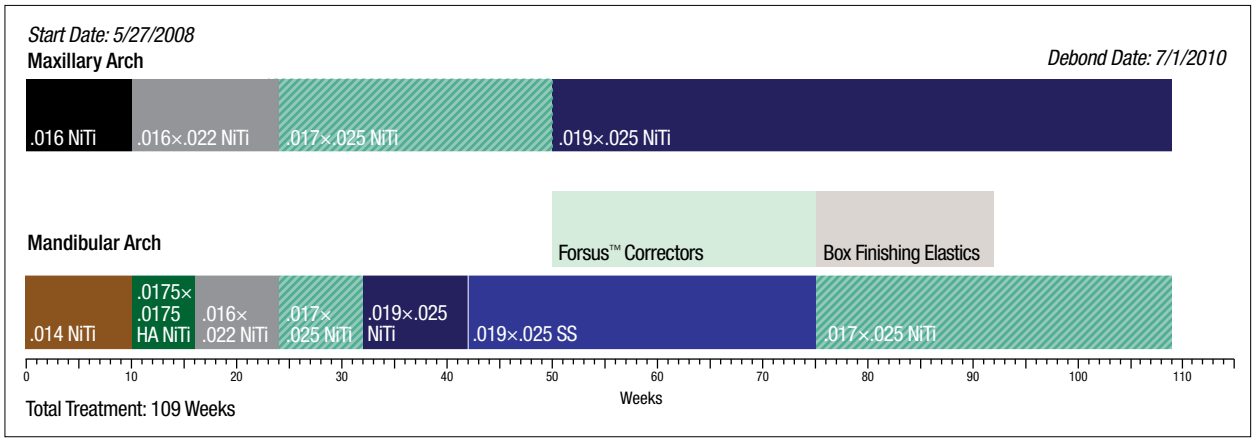


Figure 10: Treatment Timeline and Archwire Sequence.

Case 8 – Severe Overjet with Extractions

Patient
Female: age 11 years, 2 months

Diagnosis
Class II malocclusion

- Severe overjet
- Maxillary protrusion
- Mandibular retrognathic
- Mild maxillary crowding
- Moderate mandibular crowding

Treatment Timeframe

Treatment Start:	07/13/2005
Forsus™ Correctors Placed:	05/31/2006
Forsus Correctors Removed:	09/25/2006
Forsus Correctors Duration:	4 months
Treatment End:	09/27/2007
Treatment Time:	26 months, 2 weeks

Treatment Plan
- .022 slot Victory Series™ Brackets, MBT™ Appliance System Rx with -6 degrees of torque
- Extract maxillary first bicuspids
- Extract mandibular second bicuspids
- Forsus™ Fatigue Resistant Device to correct Class II relationship and act as anchorage during extraction space closure

Initial

Initial ABO Analysis					
Maxilla to Cranial Base					
SNA (°)	85.5	82.0	3.5	1.0	*
Mandible to Cranial Base					
SNB (°)	78.0	80.9	3.4	-0.8	
SN – GoGn (°)	31.4	32.9	5.2	-0.3	
FMA (MP-FH) (°)	25.5	25.2	4.5	0.1	
Maxillo-Mandibular					
ANB (°)	7.5	1.6	1.5	3.9	***
Maxillary Dentition					
U1 – NA (mm)	2.8	4.3	2.7	-0.6	
U1 – SN (°)	99.0	102.4	5.5	-0.6	
Mandibular Dentition					
L1 – NB (mm)	4.8	4.0	1.8	0.5	
L1 – GoGn (°)	96.0	93.0	6.0	0.5	
Soft Tissue					
Lower Lip to E-Plane (mm)	7.1	-2.0	2.0	4.5	*****
Upper Lip to E-Plane (mm)	4.9	-3.4	2.0	4.2	*****

Table 1: Initial ABO analysis.

Figure 1: Initial.

Figure 2: Initial cephalometric x-ray.

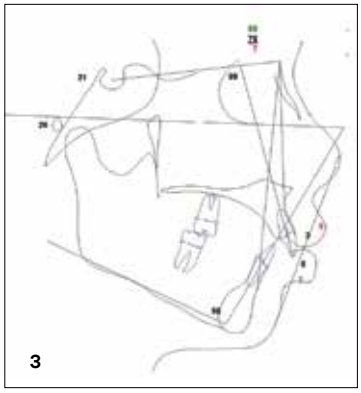
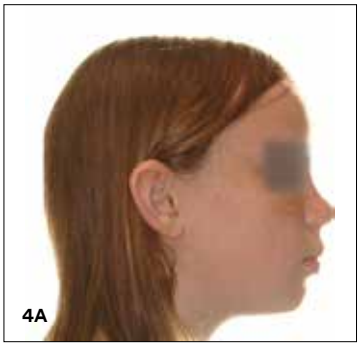
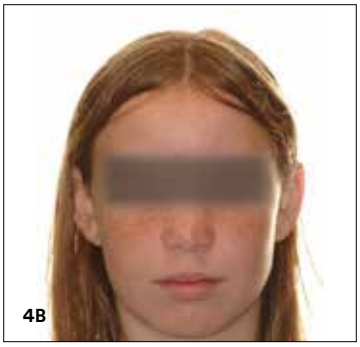


Figure 3: Initial lateral tracing.





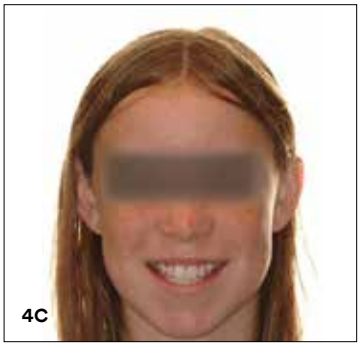


Figure 4A-H: Initial.

Final

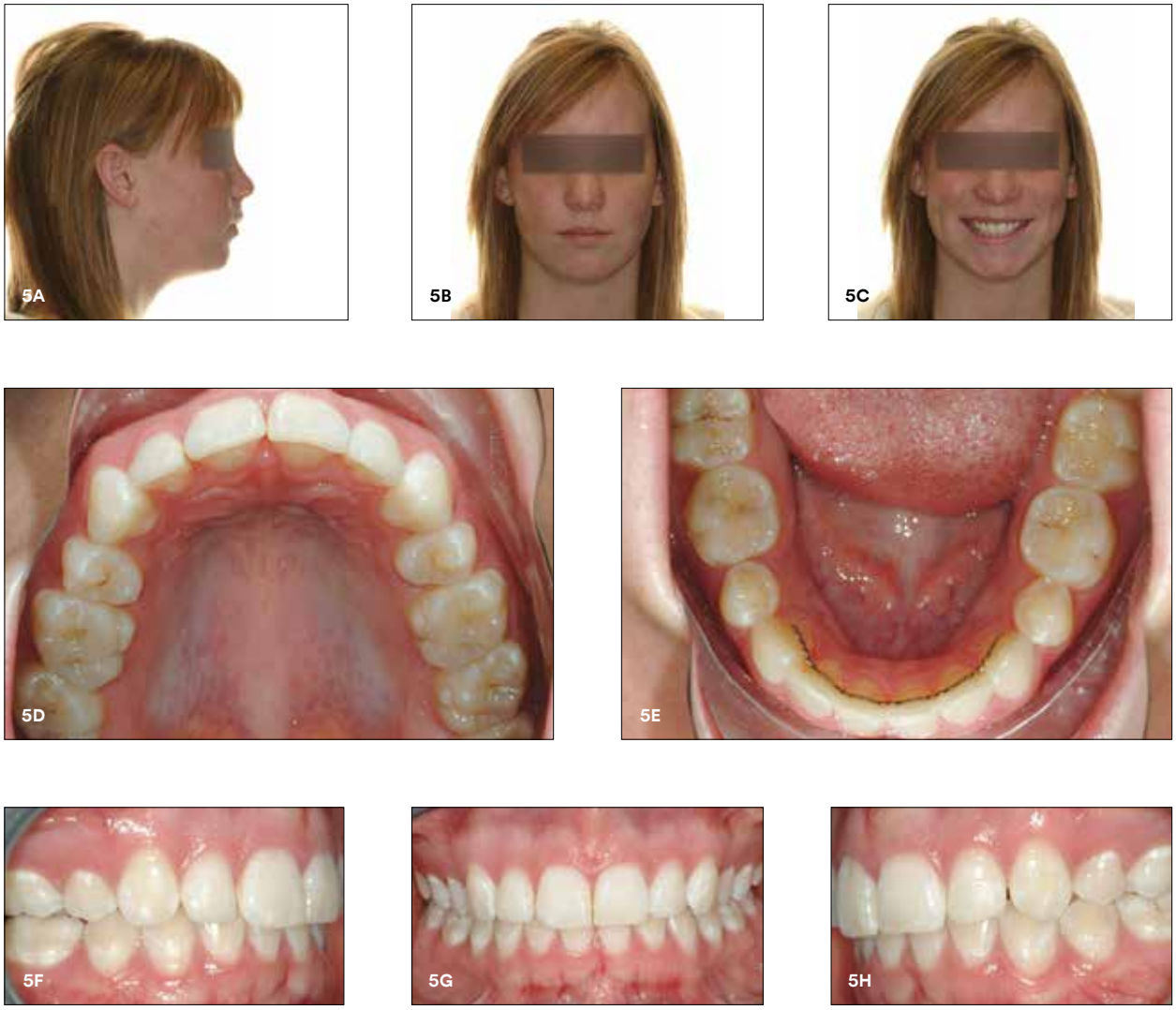


Figure 5A-H: Final.

Figure 6A: Initial cephalometric x-ray.

Figure 6B: Final cephalometric x-ray.

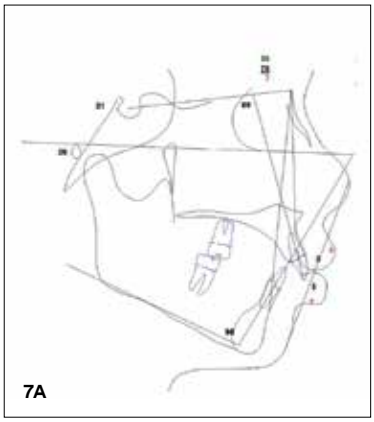


Figure 7A: Initial lateral tracing.

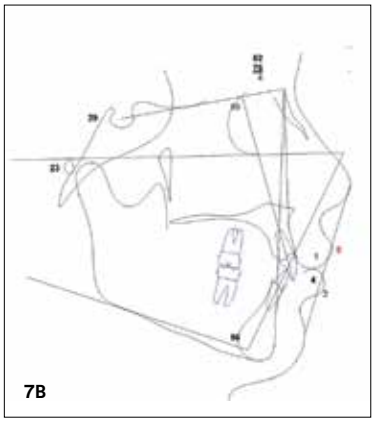


Figure 7B: Final lateral tracing.

Figure 8A: Initial facial profile.

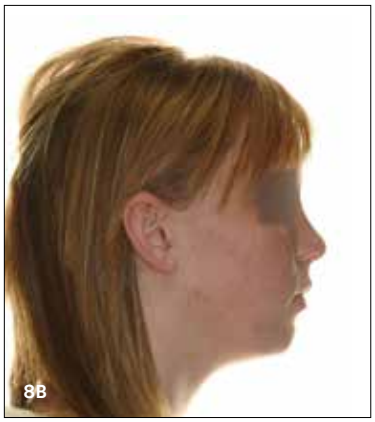


Figure 8B: Final facial profile.

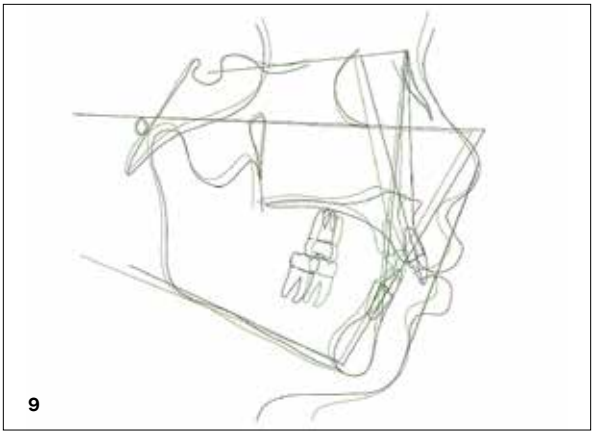


Figure 9: Superimpositions: Black initial. Green final treatment.

Final ABO Analysis				
Maxilla to Cranial Base				
SNA (°)	81.5	82.0	3.5	-0.1
Mandible to Cranial Base				
SNB (°)	77.7	80.9	3.4	-0.9
SN – GoGn (°)	28.6	32.9	5.2	-0.8
FMA (MP-FH) (°)	23.1	23.9	4.5	-0.2
Maxillo-Mandibular				
ANB (°)	3.8	1.6	1.5	1.5 *
Maxillary Dentition				
U1 – NA (mm)	1.2	4.3	2.7	-1.1 *
U1 – SN (°)	95.2	102.8	5.5	-1.4 *
Mandibular Dentition				
L1 – NB (mm)	3.7	4.0	1.8	-0.1
L1 – GoGn (°)	97.7	93.0	6.0	0.8
Soft Tissue				
Lower Lip to E-Plane (mm)	1.9	-2.0	2.0	1.9 *
Upper Lip to E-Plane (mm)	0.1	-6.0	2.0	3.1 ***

Table 2: Final ABO analysis.

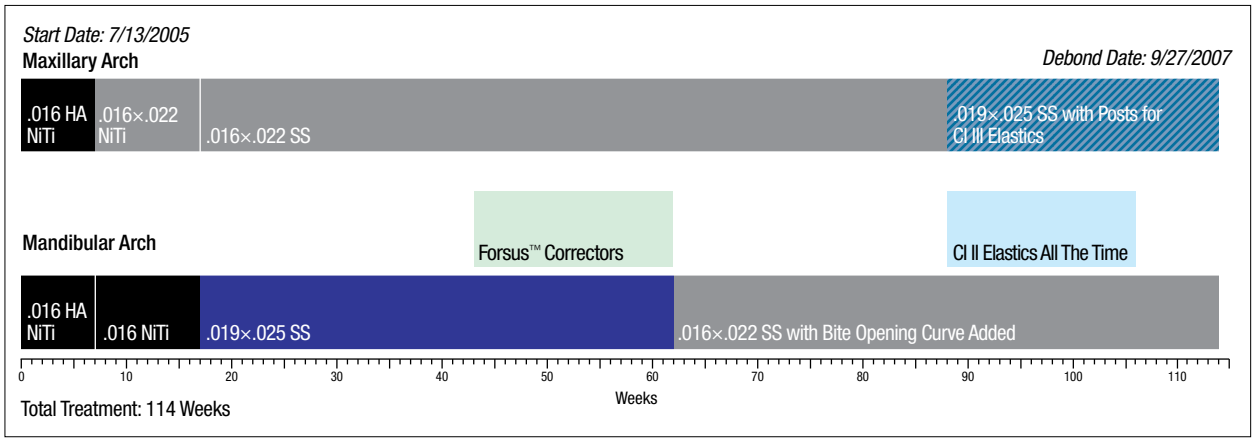


Figure 10: Treatment Timeline and Archwire Sequence.

Case 9 – Adult Patient with Crowding and Incisor Protrusion

Patient
Female: age 20 years, 1 month

Diagnosis
Class II Division I with mild crowding
Maxillary incisor protrusion

Treatment Plan
- Clarity™ Ceramic Brackets, MBT™ Appliance System Rx
- Extract maxillary 1st premolars
- Band both arches
- Cervical traction headgear, level and align teeth
- Retract maxillary anteriors and Forsus™ springs
- U/L finishing bends

Treatment Timeframe

Treatment Start:	10/29/2002
Forsus™ Correctors Placed:	06/19/2003
Forsus Correctors Removed:	11/20/2003
Forsus Correctors Duration:	5 months
Treatment End:	08/15/2005
Treatment Time:	33 months, 2 weeks*

* Due to patient illness, patient could not come to all scheduled appointments, resulting in extended treatment time.

Treatment Sequence
- Banded both arches after 5's extracted, leveled and aligned – 3 months
- Banded mandibular 2nd molars and delivered headgear. Continued leveling and aligning – 3 months
- Banded maxillary 2nd molars and retracted canines – 3 months
- Forsus™ Correctors and upper space closure – 5 months
- Continued space closure – 11 months (due to patient illness, patient could not come to all scheduled appointments, resulting in extended treatment time)
- Finishing bends, Class II elastics – 6 months

Initial

Initial Steiner Analysis					
Measurement	Units	Meas.	Norm	Dev.	
SNA	(deg)	85.6	82.0	1.2	*
SNB	(deg)	80.8	80.0	0.3	
ANB	(deg)	4.7	2.0	1.4	*
Mx 1 – NA	(mm)	11.2	4.0	2.4	**
Mx 1 – NA Angle	(deg)	36.4	22.0	2.4	**
Md 1 – NB	(mm)	8.8	4.0	1.6	*
Md 1 – NB Angle	(deg)	30.3	25.0	0.9	
PO – NB	(mm)	0.9	1.0	-0.0	
Occlusal Plane – SN	(deg)	11.4	14.0	-0.7	
GO-GN – SN	(deg)	28.5	32.0	-0.8	
Interincisor Angle	(deg)	108.6	130.0	-3.6	***
Wits Appraisal	(mm)	3.5	1.1	1.2	*
Calculated ANB	(deg)	4.8	2.0	1.4	*
FMA	(deg)	23.6	25.0	-0.2	
FMIA	(deg)	55.5	65.0	-1.6	*
IMPA	(deg)	100.9	90.0	1.8	*

Table 1: Initial Steiner analysis.

Figure 1: Initial.

Figure 2: Initial cephalometric x-ray.

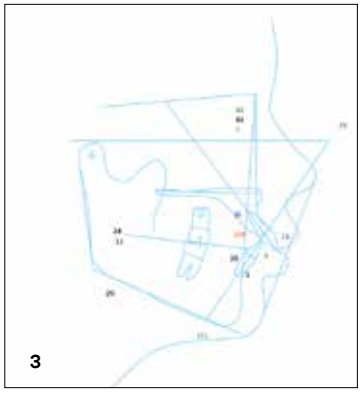


Figure 3: Initial lateral tracing.

Figure 4A-G: Initial.

Initial: Post-extraction

Figure 5: Initial, post-extraction.

Forsus™ Correctors

Figure 6A-C: Forsus™ Correctors placed.

Figure 7A-C: Forsus™ Correctors removed.

Final

Figure 8A-E: Final.

Figure 9A: Initial cephalometric x-ray.

Figure 9B: Final cephalometric x-ray.

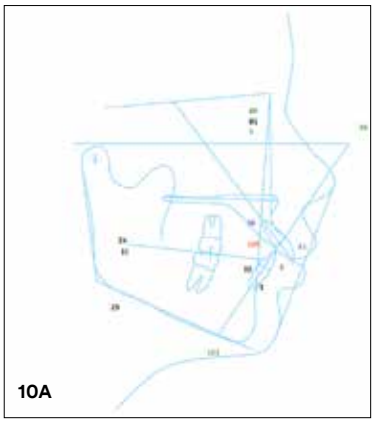


Figure 10A: Initial lateral tracing.

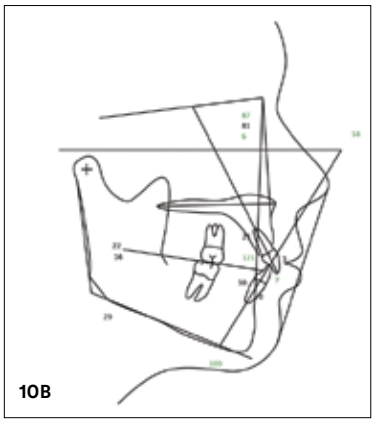


Figure 10B: Final lateral tracing.

Figure 11A: Initial facial profile.

Figure 11B: Final facial profile.

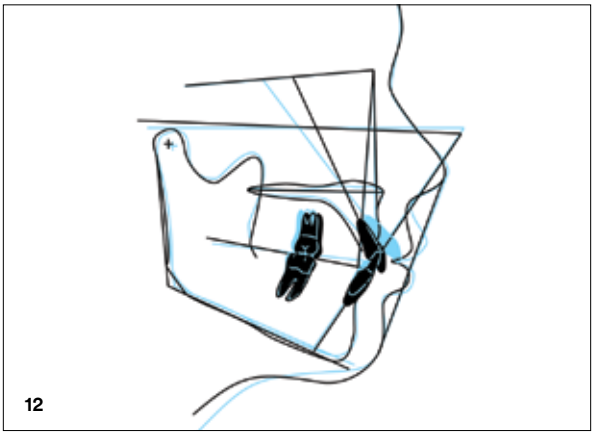


Figure 12: Superimpositions: Blue initial. Black final treatment.

Final Steiner Analysis				
Measurement	Units	Meas.	Norm	Dev.
SNA	(deg)	86.7	82.0	1.6 *
SNB	(deg)	80.8	80.0	0.3
ANB	(deg)	5.9	2.0	2.0 *
Mx 1 – NA	(mm)	2.7	4.0	-0.4
Mx 1 – NA Angle	(deg)	23.4	22.0	0.2
Md 1 – NB	(mm)	7.4	4.0	1.1 *
Md 1 – NB Angle	(deg)	29.7	25.0	0.8
PO – NB	(mm)	-0.4	1.0	-0.8
Occlusal Plane – SN	(deg)	15.5	14.0	0.4
GO-GN – SN	(deg)	29.3	32.0	-0.6
Interincisor Angle	(deg)	121.0	130.0	-1.5 *
Wits Appraisal	(mm)	2.1	1.1	0.5
Calculated ANB	(deg)	5.4	2.0	1.7 *
FMA	(deg)	22.3	25.0	-0.5
FMIA	(deg)	58.1	65.0	-1.1 *
IMPA	(deg)	99.6	90.0	1.6 *

Table 2: Final Steiner analysis.

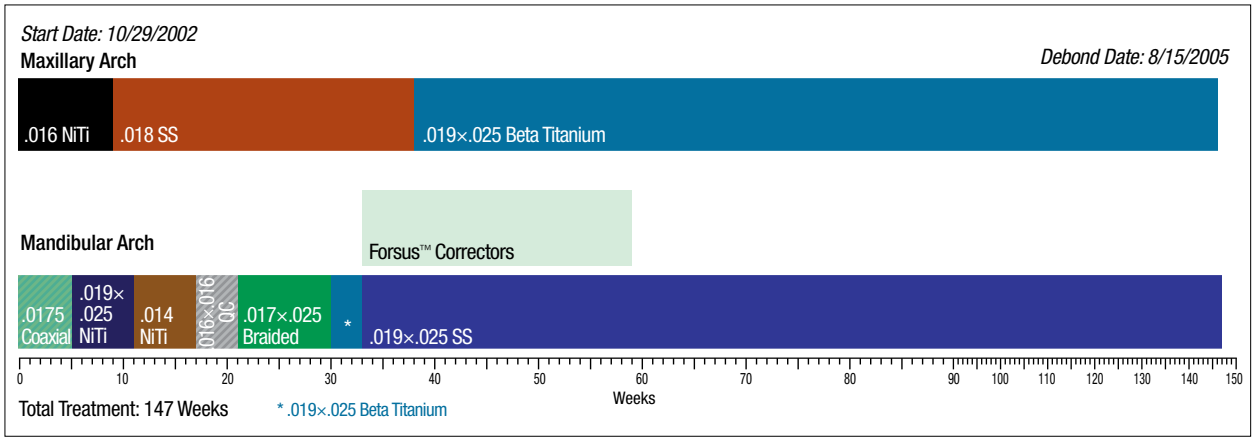


Figure 13: Treatment Timeline and Archwire Sequence.

Case 10 – Adult Patient with Overbite and Open Bite Tendency

Patient
Female: age 40 years, 9 months

Diagnosis
Class II Division I with moderate maxillary and mild mandibular crowding. Excess overbite, short ramus and skeletal open bite tendency, skeletal mandibular deficiency. Patient did not want orthognathic surgery.

Treatment Plan
- Clarity™ Ceramic Brackets, MBT™ Appliance System Rx
- Camouflage treatment
- Band maxillary arch, level and align
- Band mandibular arch, level and align
- Forsus™ Fatigue Resistant Device springs
- Upper space closure
- Finishing bends
- Anterior Bite Plane if needed

Treatment Timeframe

Treatment Start:	06/03/2003
Forsus™ Correctors Placed:	09/28/2004
Forsus Correctors Removed (Left):	03/22/2005
Forsus Correctors Removed (Right):	04/19/2005
Forsus Correctors Duration:	6 months, 3 weeks
Treatment End:	12/20/2005
Treatment Time:	30 months, 3 weeks

Treatment Sequence
- Banded upper, leveled and aligned. Reproximated anteriors to alleviate the crowding – 9 months
- Banded lower, delivered anterior bite plane, banded 7's, leveled and aligned – 6 months
- Forsus Correctors (removed left after 6 months, right in 7 months)
- Space closure – 4 months, Class II's on right
- Finishing – 4 months

Initial

Initial Steiner Analysis					
Measurement	Units	Meas.	Norm	Dev.	
SNA	(deg)	78.2	82.0	-1.3	*
SNB	(deg)	69.2	80.0	-3.6	***
ANB	(deg)	9.0	2.0	3.5	***
Mx 1 – NA	(mm)	-2.6	4.0	-2.2	**
Mx 1 – NA Angle	(deg)	-2.2	22.0	-4.0	***
Md 1 – NB	(mm)	7.1	4.0	1.0	*
Md 1 – NB Angle	(deg)	36.5	25.0	1.9	*
PO – NB	(mm)	-1.5	1.0	-1.4	*
Occlusal Plane – SN	(deg)	28.0	14.0	4.0	***
GO-GN – SN	(deg)	45.6	32.0	3.0	***
Interincisor Angle	(deg)	136.7	130.0	1.1	*
Wits Appraisal	(mm)	6.5	1.1	2.8	**
Calculated ANB	(deg)	5.3	2.0	1.6	*
FMA	(deg)	30.0	25.0	0.8	
FMIA	(deg)	48.4	65.0	-2.8	**
IMPA	(deg)	101.6	90.0	1.9	*

Table 1: Initial Steiner analysis.

Figure 1: Initial.

Figure 2: Initial cephalometric x-ray.

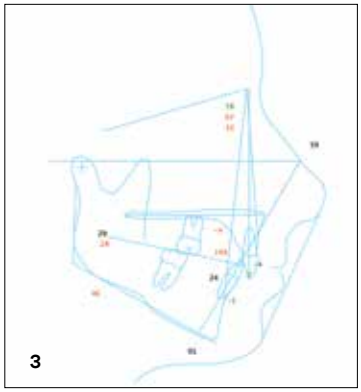
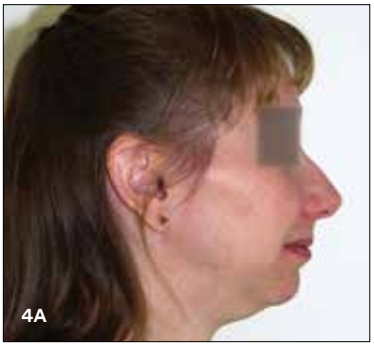


Figure 3: Initial lateral tracing.



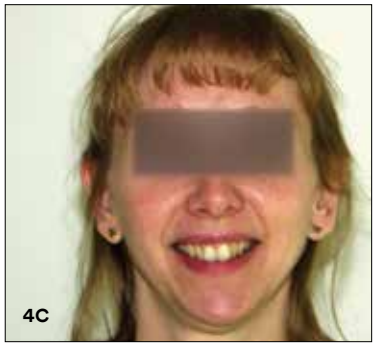


Figure 4A-H: Initial.

Forsus™ Correctors

Figure 5A-C: Forsus™ Correctors placed.

Figure 6A-C: Forsus™ Correctors removed.

Final

Figure 7A-E: Final.

Post Treatment After Restoration

Figure 8A-C: Two years post treatment.

Figure 9A-E: Four years post treatment.

Figure 10A: Initial cephalometric x-ray.

Figure 10B: Final cephalometric x-ray.

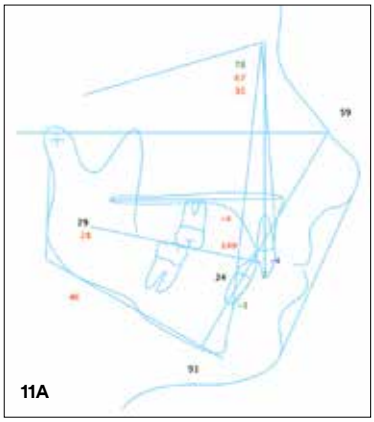


Figure 11A: Initial lateral tracing.

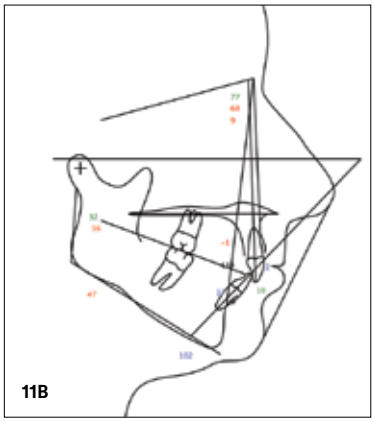


Figure 11B: Final lateral tracing.

Figure 12A: Initial facial profile.

Figure 12B: Final facial profile.

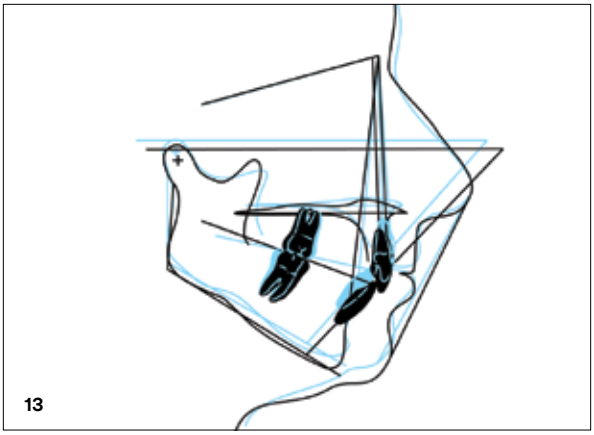


Figure 13: Superimpositions: Blue initial. Black final treatment.

Final Steiner Analysis				
Measurement	Units	Meas.	Norm	Dev.
SNA	(deg)	77.2	82.0	-1.6 *
SNB	(deg)	67.9	80.0	-4.0 ***
ANB	(deg)	9.3	2.0	3.6 ***
Mx 1 – NA	(mm)	-2.1	4.0	-2.0 **
Mx 1 – NA Angle	(deg)	-0.5	22.0	-3.8 ***
Md 1 – NB	(mm)	9.8	4.0	1.9 *
Md 1 – NB Angle	(deg)	37.0	25.0	2.0 **
PO – NB	(mm)	-0.2	1.0	-0.7
Occlusal Plane – SN	(deg)	35.7	14.0	6.2 ***
GO-GN – SN	(deg)	47.0	32.0	3.3 ***
Interincisor Angle	(deg)	134.2	130.0	0.7
Wits Appraisal	(mm)	2.8	1.1	0.9
Calculated ANB	(deg)	5.1	2.0	1.6 *
FMA	(deg)	31.7	25.0	1.1 *
FMIA	(deg)	46.2	65.0	-3.1 ***
IMPA	(deg)	102.1	90.0	2.0 **

Table 2: Final Steiner analysis.

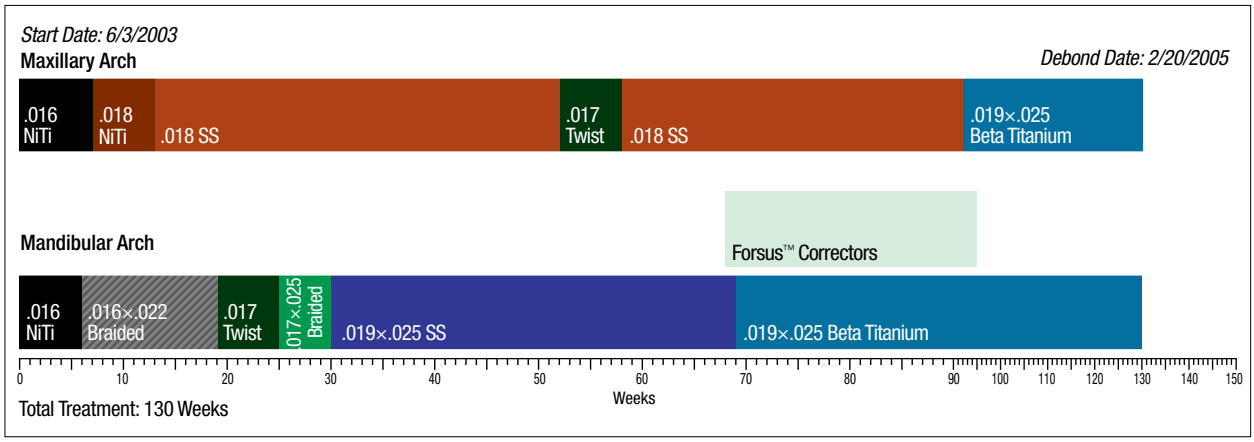


Figure 14: Treatment Timeline and Archwire Sequence.

Chapter 10

Frequently Asked Questions

1. What are the benefits of first bicuspid installation?

A. Some Forsus™ Class II Corrector users have noted the following advantages of lower first bicuspid installation:

i. Improved Patient Comfort. Because of the curve of the lower mandible and the straight length of the push rod, a push rod installed distal to the lower first bicuspid may extend less toward the patient's cheek compared to a push rod installed distal to the lower cuspid.

ii. More Aesthetic. Installed one tooth further to the posterior, the device is even less noticeable.

iii. Reduced Interference. As a more compact installation, there is less space available for hard objects to be caught between the mandibular teeth and the Forsus Corrector modules.

2. Can the Forsus Corrector be used in Phase I or early Class II treatment?

A. Yes. Please refer to the Free On Demand webinars for more information and example cases.

3. Can a rapid palatal expander (RPE) be used in conjunction with the Forsus Device?

A. Yes, an RPE can be used in conjunction with the Forsus Device during Phase 1 treatment. However, if the Forsus Device is to be used with full appliances, the RPE should be removed prior to placement of the brackets and bands.

4. Is there an athletic mouth guard that works with the Forsus Device?

A. Dr. Alvetro and Dr. Vogt recommend a mouth guard from TotalGard® that is designed to fit Class II appliances.

5. Can the Forsus Device be used for Class III malocclusions?

A. Currently there is no clinical data to support its use in Class III Correction.

6. Can the Forsus Appliance be used in adult cases?

A. Yes. The Forsus Appliance can be used to treat adult patients. Please refer to Cases 9 and 10 for examples.

7. To reposition the push rod, is there a way to open the loop on the push rod?

A. Disengage the spring module from the push rod. Using a pin and ligature cutter, place the tips between where the end of the push rod is cinched and squeeze to separate.

8. What if the bracket mesial to the push rod comes off?

A. Dr. Alvetro recommends adding a Gurin lock to the archwire in place of the bracket to finish correction.

9. Is using power chain an option instead of cinching the wire?

A. Over time, the push rod moving along the mandibular archwire will wear at the power chain. Also, using power chain may interfere with the push rod sliding on the archwire. Cinching the wire distal to the molar is more effective.

10. With self-ligating brackets, is it necessary to use a steel tie on the bracket mesial to the push rod?

A. Yes. A steel tie is required for both self-ligating and ligated brackets.

11. How is the 22 mm push rod different than the other push rod lengths?

A. The 22 mm push rod does not have a stop on it, so the spring of the module rests on the curve of the push rod. At this shorter length, the spring needs the full length of the push rod to allow enough space for the spring flexibility in most cases.

12. How is the 22 mm push rod reactivated?

A. Because there is no stop on the 22 mm push rod, it is not recommended to add a crimpable stop for reactivation. Use the 22 mm push rod to do the initial advancement, and then replace it with a 25 mm push rod when there is adequate space.

13. What if breakage occurs with the EZ2 module?

A. In the unlikely case of breakage with the EZ2 Module Clip, the spring assembly can still be used along with an L-pin. Remove the EZ2 clip from the spring assembly to expose the eyelet. Then, thread the L-pin, distal to mesial, through the spring assembly and attached to the headgear tube per the Installation Instructions on Page 19.

14. Can a push rod be customized to a specific length?

A. Yes. The 38 mm push rod is designed to be customized. Trim the push rod at its distal end to the desired length. A stop must be soldered to the push rod before installation.

15. If, during Forsus™ Corrector treatment, the patient exhibits too much upper first molar intrusion, can this effect be lessened?

A. Yes. Lace first and second molar buccal tubes with a steel tie to create one stable unit as an anchor.

16. Should Forsus Correctors be used on both sides or can they be used unilaterally?

A. The Forsus Corrector can be used unilaterally for short periods of time (1-2 visits). However, most of the time, it is recommended that Forsus Correctors be used bilaterally to avoid canting of the occlusal plane and skewing of the arches. The side needing correction should be placed with ideal activation, while a non-activated Forsus Corrector is placed on the opposite side. For minor midline corrections, Forsus Correctors can be used unilaterally.

17. What are the steps to determine if the spring is non-activated?

A. “Non-activated” means that the Forsus Spring Module is not compressed by the push rod as the patient bites down. Have the patient bite in centric occlusion. Check to watch if the spring is being compressed against the stop on the push rod. The length of the spring should not change when the patient opens and closes the mouth.

18. The Forsus Appliance has been installed; however there has not been any progress. What steps should be taken?

A. First, it is important to check the activation of the Forsus Appliance. Proper activation allows the Forsus Appliance to consistently apply light force. Remeasure both slides and select the appropriate push rod lengths to provide the ideal level of activation (see Page 17 Push Rod Selection).

Chapter 11

Additional Resources

Free On Demand CE

Please visit 3MUnitekTraining.com for on demand training webinars led by Dr. Alvetro. The lectures cover a variety of topics from beginner to more advanced.

- Class II Correction (with Forsus™ Class II Correctors) for Beginners – Part I
- Management of Class II Deep Bites (with Forsus Class II Correctors) – Part II
- Management of Extraction Cases (with Forsus Class II Correctors) – Part III
- Variations in Forsus Class II Correctors: Controlling the Maxillary Vertical Dimension and Utilizing the Forsus Appliance for Dental Distalization – Part IV
- Forsus Class II Correctors: The 5 Most Common Questions and Answers

Technical Product Tutorials

Animated product demonstration videos can be found on 3MUnitekTraining.com.

- Introduction: Brief overview of the components and function of the Forsus Class II Corrector
- Module Installation: Installing the Forsus EZ2 Module or L-Pin Module into a headgear tube
- Preparation: The steps required to follow before installing Forsus Class II Correctors in the mouth
- Push Rod Installation: Measuring, installing, and reactivating Forsus Push Rods
- Removal: Module and Push Rod Removal

Orthodontic Perspectives Reprints

Please ask your 3M Unitek representative for a collection of articles from *Orthodontic Perspectives* on the Forsus device. Below is a sample of the articles included:

- *Forsus™ Fatigue Resistant Device: Fatigue Resistant by Design*
  Jim Cleary and Bill Wyllie, 3M Unitek
- *The Forsus™ Fatigue Resistant Device 10 Years at Hard Labor (and still going strong)*
  Jim Cleary, 3M Unitek
- *The Forsus™ Fatigue Resistant Device: Better Than Elastics for Class II*
  Pascal Baron, DDS, MSc, PhD
- *The Forsus™ Appliance: Characteristics and Clinical Case*
  Min-Ho Jung, DDS, MSD, PhD
- *From "Plan B" to "Plan A": Using Forsus™ Class II Correctors as a Regular Mode of Treatment*
  Lisa Alvetro, DDS
- *Class II Pushing Correctors and the Occlusal Plane*
  Michel Di Battista, DDS
- *Stability and Relapse of Class II Correction Using the Forsus™ Fatigue Resistant Device*
  Robert Miller, DMD
- *Correction of Class II Subdivision Malocclusion with the Forsus™ Appliance*
  Don Murdock, DMD, MS
- *Incorporating the Forsus™ Fatigue Resistant Device with the Incognito™ Appliance System*
  Neal D. Kravitz, DMD
- *Forsus™ Fatigue Resistant Device: Small Push Rods, Large Benefits*
  William Vogt, DDS
- *Xbow™: Straight to the Target When Straight is the Target*
  Duncan W. Higgins, DDS MSD FRCD(C)
- *A Chairside Perspective of Forsus™ Class II Correctors*
  Mary Thomas, C.O.A.
- *Forsus™ Class II Correctors as an Effective and Efficient Form of Anchorage in Extraction Cases*
  Lisa Alvetro, DDS, MSD
- *Applicability of the Forsus™ Fatigue Resistant Device as a Class II Corrector in Young Adults*
  Chetan V. Jayade, DDS
- *Forsus™ Class II Correctors: Is there an Age Limit?*
  Stephan Tisseront, DDS, MS

Forsus™ Fatigue Resistant Device Literature References

- **Effectiveness of comprehensive fixed appliance treatment used with the Forsus Fatigue Resistant Device in Class II patients**
  Franchi, L., Alvetro, L., Giuntini, V., Masucci, C., Defraia E., & Baccetti, T. (2011) *The Angle Orthodontist,* 81(4), 678-683.

- **Treatment of Skeletal Class II Malocclusion Using The "Forsus" Appliance: A Case Report**
  Chaukse A., Jain, S., Reddy, M., Dubey, R., John, S., & Suma S. (2011) *People's Journal of Scientific Research,* 4(1), 39-42.

- **Comparison of treatments with the Forsus fatigue resistant device in relation to skeletal maturity: A cephalometric and magnetic resonance imaging study**
  Aras, A., Ada, E., Saracoglu, H., Gezer, N., & Aras, I., (2011). *American Journal of Orthodontics & Dentofacial Orthopedics,* 140 (5), 616-625.

- **Muscle Response during Treatment of Class II Division 1 Malocclusion with Forsus Fatigue Resistant Device**
  Sood, S., Kharbanda O., Duggal, R., Sood, M., & Gulati, S. (2011). *Journal of Clinical Pediatric Dentistry,* 35(3), 331-338.

- **A Case Report of Growing Skeletal Class II Treated with Forsus Fatigue Resistance Appliance**
  Muralidhar Reddy Y & Madhukar Reddy R. (2011). *Annals and Essences of Dentistry,* 3(1), 89-93.

- **Evaluation of the Immediate Dentofacial Changes in Late Adolescent Patients Treated with the Forsus™ FRD**
  Gunay, E., Arun, T. & Nalbantgil, D. (2011). *European Journal of Dentistry,* 5(4), 423-432.

- **Class II Non-Extraction Patients Treated with the Forsus Fatigue Resistant Device Versus Intermaxillary Elastics**
  Jones, G., Buschang, P., Kim, K., & Oliver, D. (2008). *The Angle Orthodontist,* 78(2), 332-338.

- **Force-Deflection Characteristics of the Fatigue-Resistant Device Spring: An In Vitro Study**
  ElSheikh, M., Godfrey, K., Manosudprasit, M., & Viwattanatipa, N. (2007). *World Journal of Orthodontics,* 8(1), 30-36.

- **The Forsus Fatigue Resistant Device**
  Vogt, W. (2006). *Journal of Clinical Orthodontics,* 40(6), 368-377.

- **A Forsus distalizer: A pilot typodont study**
  ElSheikh, M., Godfrey, K., Manosudprasit, M., & Viwattanatipa, N. (2004). *KDJ,* 7(2), 107-115.

In-Office Patient Materials

- Forsus™ Class II Correctors Patient Brochure (REF 016-963)
- Forsus™ Class II Correctors Important Patient Information Brochure (REF 014-462)

Patient Brochure

Important Patient Information Brochure

Parts List

Description	Unit	Side	Part No.
Kits			
Forsus™ Fatigue Resistant Device EZ2 Module 20-Patient Kit	Kit		885-142
Forsus EZ2 Module 5-Patient Kit	Kit		885-141
L-Pin Module 5-Patient Kit	Kit		885-121
L-Pin Module 20-Patient Kit	Kit		885-122
Individual Components			
Forsus EZ2 Module Reorder Pack (Engagement clip and spring)	pkg/5	L	885-148
Forsus EZ2 Module Reorder Pack (Engagement clip and spring)	pkg/5	R	885-149
L-Pins	pkg/10		885-110
L-Pin Spring Modules	pkg/5		885-100
Direct Push Rod X-Short (22 mm)	pkg/5	L	885-009
Direct Push Rod X-Short (22 mm)	pkg/5	R	885-010
Direct Push Rod Short (25 mm)	pkg/5	L	885-111
Direct Push Rod Short (25 mm)	pkg/5	R	885-112
Direct Push Rod Medium (29 mm)	pkg/5	L	885-113
Direct Push Rod Medium (29 mm)	pkg/5	R	885-114
Direct Push Rod Large (32 mm)	pkg/5	L	885-115
Direct Push Rod Large (32 mm)	pkg/5	R	885-116
Direct Push Rod X-Large (35 mm)	pkg/5	L	885-117
Direct Push Rod X-Large (35 mm)	pkg/5	R	885-118
Direct Push Rod XX-Large (38 mm)	pkg/5	L	885-107
Direct Push Rod XX-Large (38 mm)	pkg/5	R	885-108
Universal Split Crimp	pkg/50		885-203
Measurement Guide	pkg/5		807-014

Kit Contents	5-Patient		20-Patient	
Attachment	**EZ2 Module**	**L-Pin**	**EZ2 Module**	**L-Pin**
Push Rods				
X-Short (22 mm)	1 L, 1 R	–	5 L, 5 R	–
Short (25 mm)	1 L, 1 R	1 L, 1 R	5 L, 5 R	5 L, 5 R
Medium (29 mm)	2 L, 2 R	1 L, 1 R	5 L, 5 R	5 L, 5 R
Large (32 mm)	1 L, 1 R	2 L, 2 R	5 L, 5 R	5 L, 5 R
XL (35 mm)	–	1 L, 1 R	–	5 L, 5 R
Auxiliaries				
Split Crimps	16	16	50	50
Measurement Guides	5	2	20	5
Modules				
EZ2 Modules	5 L, 5 R	–	20 L, 20 R	–
L-Pins	–	16	–	50
L-Pin Modules	–	10	–	40

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