Dirk Wiechmann, DDS
Bad Essen, Germany

The ardent enthusiasm that orthodontists displayed for lingual therapy in the mid-eighties has been followed by a long period of disenchantment. Today, technological advancements in both materials and processes are creating renewed interest in lingual protocols. I believe that with an optimized bracket-positioning system, customized superelastic archwires and a reliable bonding protocol, lingual therapy can be incorporated successfully into an orthodontic practice just as economically and efficiently as labial treatment (Case 1 shown below).

A critical factor in the efficiency of any orthodontic practice is chair time. Twenty-five percent of my patients wear lingual brackets while undergoing treatment with fixed appliances. The amount of chair time to complete a similar case is the same for both my lingual and labial patients. We start approximately three new lingual cases per week. Because of the number of ongoing cases, my team and I have developed a specific routine for lingual patients, which allows me to delegate to my assistants just as many lingual as labial tasks.

When I established my practice three years ago in Bad Essen, population 9,000, I was aware that patients in a rural area would not be prepared to pay much more for orthodontic treatment just because the appliances were not visible. The question I asked myself was how I could get the same quality result with both lingual and labial therapy with similar efficiency. My staff and I now know the answer, and it is gratifying to see the broad smiles of enthusiastic lingual patients who had rejected conventional methods.

Case 1: Treatment in 10 Months with 1 Archwire in Each Arch

Pretreatment. 14-year-old female, Class II, division 2 with pronounced deep bite and anterior crowding in both arches.

The lingual brackets acted as a bite turbo, immediately correcting the deep bite. The resulting open bite was closed in the short term by intrusion of the incisors and extrusion of the.

After 10 months of treatment, just before debonding. The customized bracket positioning had dispensed with the need for any finishing bends. The entire treatment was carried out
Lingual orthodontics is common in big cities such as Beverly Hills, Paris and Tokyo, but if lingual orthodontics can work in Bad Essen, it can work in small towns anywhere in the world, maybe even yours.

**Customized Archwires: The Foundation of Efficient Lingual Therapy**

Applying state-of-the-art techniques for fabricating customized lingual archwires (i.e., superelastic 35°C Copper Ni-Ti®, stainless steel, and TMA®) is one of the cornerstones of my success with lingual therapy. My practice utilizes a new lingual treatment concept I call ECO-Lingual Therapy. With a computer-controlled bending robot, customized archwires are individually shaped in the lab. Precision fit greatly reduces the number of archwires required to complete a case. Customization provides easier archwire delivery, which results in greater comfort for the patient and reduced chair time and bracket loss.

Lingual archwire replacement is a labor-intensive procedure. Usually ECO-Lingual Therapy involves only three archwires. The first and most important is an .016 x .022 Copper Ni-Ti. The performance of this superelastic archwire in the initial phase of labial treatment is well known. There may be nonextraction cases when it is the only archwire used. The other two archwires that I use are an .016 x .022 stainless steel wire for closing extraction sites or to insert Class II or Class III elastics and an .0175 x .0175 TMA wire for finishing.

Customized archwires also dispense with the need for thick lining of traditional lingual bracket pads, which are designed to offset different tooth thicknesses. Customized archwires allow each bracket to be bonded to the tooth as closely as possible.

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Dr. Dirk Wiechmann received his D.D.S. in 1989, M.S. in 1990 and postgraduate degree in orthodontics and dentofacial orthopedics in 1997 from the University of Münster, Germany, followed by a postgraduate degree in lingual orthodontics in 1998 from the University Paris V, France. Dr. Wiechmann is a clinical instructor in the postgraduate program at the University of Münster and is currently the president of the European Society for Lingual Orthodontics (ESLO). He gives lectures and courses in the United States, Europe and Africa. He has authored articles on lingual orthodontics in several journals, including English publications. Dr. Wiechmann has been in private practice since 1997 in rural Bad Essen near Osnabrück, Germany. He is starting about 150 lingual cases each year.
Dr. Wiechmann

possible. The different tooth thicknesses are offset by minor first-order bends in the customized archwires.

**Bracket Positioning Based on Patient's Ideal Occlusion**

With customized archwires came the opportunity to design a modified bracket-positioning system, which I call TOP (Transfer Optimized Positioning). This system ensures maximum flatness of the lingual appliance. The brackets are positioned with the TARG-Pro (a modified positioning device) for indirect bonding (Figure 1).

Using the patient's maloccluded model, we prepare a target setup to provide customized positioning based on the patient's ideal occlusion rather than preset values used by other systems. We align the setup model three-dimensionally using a laser. Then the reference arm setting of the TARG-Pro is customized according to the setup model. To position the brackets, we replace the setup model with the maloccluded model. We deliver the appliances to the patient using a two-layer bonding tray and bond the entire arch in one operation, saving a great amount of time.

The TOP process offers four major advantages over conventional lingual placement techniques.
1. Reduced bracket loss. The flat design helps prevent bracket loss.
2. Reduced gingival irritation. Since the

**Case 2: Treatment in 13 Months with 3 Archwires in Upper Arch and 2 Archwires**

Pretreatment: 19-year-old male, Class II, division 2 with poor torque in the upper anterior region, the maxillary midline markedly left and the upper left canine poorly positioned.

Following extraction of the upper first premolars, both cuspids were distalized using the first archwire, an .016 x .022 Copper Ni-Ti. The correct anterior root torque was set by giving the archwire a customized 15° lingual root torque overcorrection for the upper central incisors, which corrected the anterior crowding. A second archwire, an .016 x .022 stainless steel, was inserted for the extraction site closure. This customized archwire also has a 15° lingual root torque overcorrection for the upper central incisors. A third and final archwire, an .0175 x .0175 TMA with one finishing bend, was used because the extreme malpositioning of the upper left canine prevented optimal positioning of the bracket.

After 13 months of treatment, the patient displayed clear-cut improvement of the anterior tooth torque. No bracket rebonding was necessary.
appliance fits more closely to the tooth, the area exposed to plaque deposits is reduced, particularly in the immediate supragingival area.

3. **Increased patient comfort.** The relatively flat design is less restrictive to the tongue, allowing patients to become accustomed to the appliance more quickly.

4. **Simplified finishing process.** The customized bracket positioning based on specifications from the patient's model often dispenses with additional finishing corrections in the archwire.

**Dependable Bonding Promotes Efficiency**

Lingual indirect bonding saves a great deal of time compared with conventional labial direct bonding. In my practice, lingual indirect bonding requires only half the time for placement as compared with labial direct bonding.

Bracket loss complicates the course of treatment. Lingual rebonding is even more time-consuming and requires maximum precision. An important aspect of successful bonding is optimized bond strength, which I accomplish in my practice with micro-abrasion.

**Intraoral sandblasting** of the tooth surface prior to etching increases the composite-enamel bond strength significantly, both clinically and under laboratory conditions by as much as 37%.

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**in Lower Arch**

There was also moderate crowding in the lower arch.

The mandibular anterior crowding was corrected by interproximal polishing while the customized .016 x .022 Copper Ni-Ti archwire was in place. The patient had to wear Class II elastics on the right side during the retraction phase. An .016 x .022 stainless steel wire was inserted as the second and final archwire. The optimal bracket positioning dispensed with any archwire finishing bends.

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Clinical Examples of Archwire Use in Lingual Orthodontics

Customizing archwires has allowed our practice to manage a number of lingual protocols differently from conventional lingual treatment. The following examples show how we have used customized archwires in cases of expansion, protrusion, torque control and derotation.

Expansion Without a Functional Device

A transversally underdeveloped maxillary arch can be expanded with a customized archwire (Figure 2a). Expansion is achieved without such transpalatal devices as a Quad-helix appliance or Hyrax palatal expander (Figure 2b).

Using crimplable expansion stops on a customized Copper Ni-Ti archwire is an effective means of expanding the mandibular arch. In the case shown (Figure 3a), the severe crowding of the mandible precluded ligating the incisor area so I added two crimplable stops to an .016 x .022 Copper Ni-Ti archwire in the canine regions with expansion built-in between the stops. By deflecting the wire lingually and engaging it into the archwire slot, expansion force was achieved. After several weeks, gaps appeared and the expansion stops were removed (Figure 3b). After 3 months, the incisor group was corrected using the same archwire (Figure 3c).

Gaining Space through Protrusion

As with expansion, space can be gained through protrusion in Class II, division 2 cases without additional measures when the archwire is deflected immediately on insertion. Case 1 demonstrates this technique well.

Archwire deflection is often not enough to resolve crowding, particularly in the mandible. In Figure 4a, the .016 x .022 Copper Ni-Ti archwire was ligated into the incisors with the crimpable advancement stops placed approximately 2 mm distal of the mesial edge of the first molar bracket. Once ligated, the anterior segment of the archwire was deflected (Figure 4b).

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Dr. Wiechmann

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Case 3: Treatment in 13 Months with 3 Archwires in Upper Arch and 2 Archwires in Lower Arch

Pretreatment. 17-year-old female with ectopic cuspid and anterior crossbite. Vestibular tooth surfaces displayed substantial demineralization, although she had no previous orthodontic treatment. Appliances were placed lingually to avoid aggravating this condition.

A customized .016 x .022 Copper Ni-Ti archwire with a crimpable advancement stop in front of the upper right molar was used for gap opening. Following gap opening and placement of a facing in the gap area, the cuspid was exposed surgically. The archwire was detached distal to the right lateral incisor and inserted for elongation of the exposed tooth. For complete vertical adjustment, another customized Copper Ni-Ti archwire was inserted as the second archwire after optimized bracket positioning of the upper right canine. An .0175 x .0175 TMA with one bilateral 0.5 mm vertical step distal to the cuspids was inserted for the finishing process, reinforcing the overbite.

The first archwire inserted in the mandible was a customized .016 x .022 Copper Ni-Ti, which would correct some rotated teeth. The overbite was reinforced in the finishing process by inserting an .0175 x .0175 TMA with a vertical step.

After 13 months of treatment, prior to debonding. No further finishing bends were needed in the final archwire. No bracket rebonding was necessary during treatment.
My interest in self-ligating brackets began in 1996. Initially it seemed that self-ligation would just make archwire changes less time-consuming but as I delved deeper into the subject, certain things became more apparent. Reduced friction, in particular, made sense to me. If friction could be dramatically reduced, lighter forces could be used to move teeth in a more biologically compatible manner. I discovered these characteristics were found in the Damon System of passive self-ligating brackets that Dr. Dwight Damon developed.

After attending Dr. Damon’s 1997 hands-on course in New Orleans, I was enthusiastic about the system. He showed a variety of cases clearly demonstrating that low-friction brackets in combination with light alloy wires moved teeth faster and that patients reported much less discomfort than with conventional systems.

The easy and fast movement of teeth with low friction clicked for me because of my experience with Dr. Jim Hilger’s Pendulum appliance. After distalizing the upper molars and stabilizing them with a Quick Nance, Hilgers recommends retracting buccal segments with light chains rather than an archwire to preserve molar anchorage. Without the archwire, bicuspids retract somewhat out of control, but movement is like a hot knife through butter. If the buccal segment is not tied in, there is no friction and movement greatly accelerates. This friction-free phenomenon was evident in Dr. Damon’s cases, and the teeth and alveolar bone seemed to respond favorably with light-force, low-friction mechanics.

From what I saw in Damon’s presentation, combined with my clinical experience, I was convinced that friction-free self-ligation therapy could be the next great revolution in orthodontics – as big as bonding and Straight-Wire®. Today, more than 3½ years later, the Damon bracket has exceeded my expectations. There is no doubt in my mind that self-ligating brackets will dramatically change treatment mechanics, but more importantly, it will modify our approach to diagnosis and treatment planning.

Flattening the Learning Curve
The greatest stumbling block that doctors and staff experience when beginning to use the Damon bracket is learning to open and close it after inserting the first archwire. The Damon System 2 is obviously much easier to learn to operate than the original Damon but, as with any new technique, there is still a learning curve. I introduced my staff to the original Damon SL bracket using typodonts for practice, but in transferring the technique from a typodont to the mouth, we found ourselves behind each day, rebonding brackets because the undue pressure we were applying was causing slides to break off and brackets to debond.

We formulated a solution using invisible retainers with Damon brackets bonded in
place (Figure 1). This allowed my staff to place archwires on one another as if they were working in a patient’s mouth (Figure 2). Their confidence with the technique grew as they worked in a no-pressure situation before moving on to the patient.

The purpose of this article is to assist those who may be ready to introduce the Damon bracket into their practice. Using our practice technique, you may be able to reduce the learning curve and reach your comfort zone more quickly.

Creating a Damon Invisible Retainer Practice Model

1. Take impressions of the upper and lower arches.
2. Pour the models in dental or dye stone. Orthodontic plaster is not recommended.
3. Trim the model in a U shape with the tongue area or palatal area removed for better vacuum adaptation. Block out any excessive undercuts.
4. Use Raintree Essix® Type A .040 material to vacuum form the invisible retainer (Figure 3). Type A material is bondable but Type C is not.
5. Lightly abrade the area where the retainer in the area where the bracket is to be bonded using a Raintree Essix Retainer Border Polisher, either green (course) or black (medium) grit (Figure 4).
6. Brush on an acrylic monomer to soften (or prime) the area over each abraded tooth to be bonded. Let dry.
7. Re-prime the tooth area to be bonded with the acrylic monomer. Let it evaporate.
8. Bond the bracket using a light-cured bonding material such as Enlight™. Light cure for 10 seconds using the Demetron Optilux 501.
9. When all the brackets are placed, light cure again for 10 seconds on all surfaces (occlusal, gingival, mesial and distal).
10. Remove the invisible retainer with the bonded brackets from the model and light cure each bracket through the retainer for 10 seconds (Figure 5).
11. Store the invisible retainer on the model for 24 hours before using it for practice.

Dr. Bogdan’s Staff Members Comment…

Ellen McCabe
Clinical Assistant with 13 years in orthodontics
“I was the office guinea pig before the retainer. I had braces 20 years ago but experienced significant relapse, so I decided on retreatment with the new Damon System, which allowed my coworkers to practice on me. Now with the retainer practice model, everyone can practice on each other.”

Kym D’Esposito
Chairside Assistant with 2 years in orthodontics
“Being new in the office, I didn’t experience any major difficulties with the Damon bracket. Everybody was amazed at how easily I could open and close the slides. The staff asked me for assistance, which helped me fit in as a new team member.”

Annette Pica
Financial Coordinator with 16 years in orthodontics
“When the doctor introduced the Damon System into his practice, we were all very curious. Kym had just started working with us and she picked up the technique very quickly, which amazed all of us. Dr. Bogdan explained that Kym didn’t have to leave her comfort zone like we did.”
Systems analysis can be a key to developing a successful orthodontic practice if you perform a critical evaluation of all your clinical procedures periodically. You will eliminate redundant processes and take advantage of new materials and technologies.

As orthodontists, the most technique-sensitive clinical procedure that we perform is the preparation for bonding brackets to etched enamel. When not properly implemented, this single procedure is both a factor in treatment success and a primary source of frustration. We wince when orthodontic consultants inform us about the true cost of bond failures to our practice, yet it is easy to become complacent and reluctantly accept 5 to 10% (or higher) bond-failure rates.

My Bonding Procedure 12 Months Ago
1. Etch the tooth enamel; rinse and dry with an air-syringe.
2. Continue enamel desiccation with a proprietary drying agent.
3. Apply a liquid fluoride sealant for protection.
4. Prime the bonding surface with the liquid portion of the no-mix adhesive.
5. Prime the bracket surface with the liquid portion of the no-mix adhesive.
6. Apply the paste portion of the no-mix adhesive to the bracket.
7. Place the bracket on the tooth.

In retrospect, it was a lot of steps to accomplish such a basic procedure, but it was important for me to do all that I could to ensure that I was providing my patients with the highest degree of protection from enamel decalcification. The high percentage of bracket failures we were experiencing (9 to 10%) was frustrating, especially when the bond failures were occurring at the first archwire tie-in. This did not give a good impression to our patients at their first major appointment.

I was skeptical when Ormco first approached me about the initial bonding results of a new all-in-one bonding sealant, Ortho Solo. I agreed to participate in clinical testing after witnessing a hands-on demonstration. Back home, we made the necessary modifications to our clinical procedures, including the use of Enlight LV adhesive and the Demetron Optilux 501 curing light.

My Bonding Procedure Now
1. Etch the tooth enamel, rinse and dry with an air-syringe (Figure 1).
2. Brush the bonding surface with Ortho Solo (Figure 2).
3. Apply the paste portion of Enlight LV light-cured adhesive to the bracket (Figure 3).
4. Place the bracket on the tooth. Light cure for 10 seconds per tooth in the Boost mode with the turbo tip (Figure 4).

Our entire bonding process was greatly simplified by the multipurpose properties that Ortho Solo demonstrates. Three individual steps of painting various preparation liquids on the enamel are now reduced to just one step, which dramatically decreases the likelihood of contaminating the etched enamel surface. Ortho Solo’s chemistry contains phosphate monomers to enhance chemical bonding, hydrophilic monomers to displace moisture, glass filler to act like a shock absorber for added strength, and a fluoride release agent.

In addition to reducing the number of required clinical steps with Ortho Solo, the time between the etched enamel and the bracket placement steps was reduced, decreasing the possibility of moisture contamination. We immediately noticed a significant decline in the number of initial tie-in bond failures. Based on our success rate from 12 months of usage, we project that at the completion of a 20-month treatment time the bond failure rate will be less than 5%. Further long-term analysis will likely reflect this lower percentage as well as provide us with data on the type and location of bond failures.

Tips When Using Ortho Solo
- Dispense Ortho Solo just before treating the etched enamel surfaces. Direct and indirect light sources can initiate a setting reaction in Ortho Solo.
- Enamel that has been etched and air dried has a frosted surface. Ortho Solo changes the appearance of the tooth from frosted to a wet glaze, allowing the user to visually verify which teeth have been treated with Ortho Solo.
- Etch and bond one arch at a time to further minimize extraneous moisture contamination.

We feel that the reevaluation of our procedures and introduction of this one-step bonding preparation has significantly improved our clinical success and diminished the costly occurrence of technique-related bonding failures in our practice.

Enhance Your Clinical Bonding

Dr. Doug Eversoll was raised and educated in the heart of Husker mania in Lincoln, Nebraska, where he now maintains a full-time orthodontic practice. He is a member of a group of orthodontists regularly called upon by Ormco for clinical evaluation.
g Experience with Ortho Solo

Figure 1. Etch the tooth enamel; rinse and dry with an air-syringe.

Figure 2. Brush the bonding surface with Ortho Solo.

Figure 3. Apply the paste portion of Enlight LV light-cured adhesive to the bracket.

Figure 4. Place the bracket on the tooth. Light cure for 10 seconds per tooth in the Boost mode with the turbo tip.
Nonextraction Therapy Benefits from Small Expansion Appliance

Dr. Mario Paz, a native of El Salvador, received his D.D.S. from the University of Santa Maria, Brazil, and his orthodontic and M.S. degrees from the Eastman Dental Center and the University of Rochester in New York, respectively. He also completed specialized training in lingual orthodontics and a fellowship in temporomandibular jaw disorder at the University of Rochester. Dr. Paz maintains private practices in Beverly Hills and Marina del Rey, California. He holds active memberships in the American Dental Association and American Association of Orthodontists, is currently president of the American Lingual Association of Orthodontists and formerly held the position of director of lingual orthodontics at the University of California at Los Angeles (UCLA).

Debates still exist regarding extraction versus nonextraction treatment in the area of early interceptive and adolescent orthodontics. Those of us who believe that early treatment is an effective method to facilitate nonextraction therapy become enthusiastic when we discover new tools that help us achieve our treatment goals. In my practice, orthopedic expansion is one of those early treatment goals. The Ormco Compact RPE (rapid palatal expander) is a small expansion device that can be used successfully in either the upper or lower arch, making functional appliances more patient friendly and comfortable (Figure 1). Patients have less bulk in their mouths and find good hygiene much easier to maintain.

The younger the child, the smaller the work area in the maxilla and mandible to place an expansion appliance. As Case 1 demonstrates, the Compact RPE is ideal for these cases. A 5½-year-old female was referred to me by the speech therapist at her school. The therapist’s main concern was that tongue interference impaired the child’s speech because both arches were constricted (Figures 2a–2b). The small size of the appliance accommodated placement high in the patient’s palate and low in the mandible, minimizing interference. As the arches expanded, the patient had more space for normal tongue function and her speech improved. The treatment time for this case was approximately 9 months (Figures 2c-2d). The patient is shown at pre- and posttreatment phases (Figures 2e-2f).

In addition to standard arch expansion, I have used the Compact RPE appliance successfully with patients requiring more complex expansion, such as differential expansion, molar distalization and adult surgical expansion.

**Differential Expansion**

When the patient requires a different amount of expansion in the posterior versus the anterior maxilla, the Compact RPE can be fabricated to provide differential expansion without making the expander bulky (Case 2). The patient will turn the expansion screws at specific intervals as required for treatment (Figures 3a–3b).

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Case 1: Early Expansion

Figures 2a–2b. Both arches show constriction at the beginning of treatment.

Figures 2c–2d. After 9 months of treatment, the arches expanded to allow space for better tongue function.

Figure 2e. Pretreatment — 5 1/2 year-old female presented with constricted arches.

Figure 2f. Posttreatment — Patient used expansion appliances for 9 months.

“In addition to standard arch expansion, I have used the Compact RPE appliance successfully with patients requiring more complex expansion, such as differential expansion, molar distalization and adult surgical expansion.”

Case 2: Differential Expansion

Figure 3a. Two appliances are used for differential expansion when more expansion is required in the maxillary anterior region than in the posterior.

Figure 3b. The amount of screw activation varies for differential expansion.
Case 3: Molar Distalization

The Compact RPE in Case 3 can be used to treat children or adults requiring molar distalization (Figures 4a–4c). I use an appliance of my own design, which I call the P-RAX. One advantage of the appliance is that it avoids molar tipping because of its rigidity. The precise amount of distalization can be achieved through manual control of the turns. Slow distalization is recommended to avoid molar tipping and anterior anchorage loss and decrease the risk of occlusal bond failure in the premolar area. Case 4 shows that midpalatal expansion can also be incorporated into the distalization appliance (Figures 5a–5d).

Adult Surgical Expansion

The compact screw is useful in cases of surgically assisted rapid palatal expansion. Adult expansion is designed to correct maxillary crossbite and/or constriction. It has gained acceptance as a reliable adult treatment option with few complications. The small size of the appliance increases adult acceptance and as Case 5 shows, it allows more space for other types of appliances such as lingual braces (Figures 6a–6c).

Whether the expansion is simple or complex, child or adult, one arch or both, the Compact RPE offers a reliable and flexible method of treatment. The concept and anchorage principles of the Compact RPE are similar to those incorporated into the design of other well-known distalization appliances such as the Pendulum (Dr. Jim Hilgers) and the G-RAX (Dr. Duane Grummons). As with any of these appliances, the designs evolve and improvements are made. The clinical knowledge we gain from using them continues to grow.

Case 4: Molar Distalization

Figure 4a. Patient required molar distalization to increase the implant space in the area of the first bicuspid, particularly on the upper left.

Figure 4b. An anchorage and distalization appliance was placed in the palate.

Figure 4c. After 8 weeks of treatment, there was significant differential movement of the second molars.

Figure 5a. Three appliances were used in the patient’s upper arch — 2 for distalization and 1 for palate expansion.

Figure 5b. Two months into treatment, some distalization and expansion has taken place.

Figure 5c. Three appliances were used in the lower arch for distalization and expansion.

Figure 5d. After 3 months, increased space in the first molar region and bicuspid region developed.
Case 5: Adult Surgical Expansion

Figure 6a. Frontal view of patient presenting with a narrow “V”-shape palate.

Figure 6b. Occlusal view shows excessive crowding and crossbite.

Figure 6c. The compact size of the screw allowed for placement high in the palate and space for lingual brackets. Significant expansion was achieved through surgical rapid palatal expansion.

I would like to thank Victor Bevins, C.D.T., for his contribution to the design and construction of the appliances used in my practice.

– Mario Paz

Compact RPE

The smallest expansion screw on the market...made even better.

The unique design of the Compact RPE has been providing doctors and patients with a range of benefits from versatility to increased comfort and good hygiene. Now improvements have been made to enhance its function while maintaining its compact size, which is three times smaller than the traditional expansion screw.

Due to its small size, Dr. Mario Paz likes the Compact RPE particularly for use in nonextraction orthodontics and uses it successfully in both upper and lower arches in a variety of configurations.

The new Compact RPE has a red-colored reference groove on the screw housing to allow easy visual identification between the left- and right-hand side of the RPE. The groove should be oriented on the patient’s left in the maxilla and on the patient’s right in the mandible.

To prevent the Compact RPE from backing up from mastication forces, a new high-temperature thread-locking compound has been applied to the screw. While it has a melting temperature of 450°F, it is recommended to use Heat Shield (available from AOA/Pro; product #9000-700) during soldering. The entire screw casing should be covered to prevent any potential heat damage to the thread-locking material.

The Compact RPE can be fabricated at an in-office lab or an outside lab, including AOA/Pro. For more information on the expansion appliance, contact your Ormco sales representative or AOA/Pro at (800) 262-5221.
MARA Provides Effective Treatment for Class II Malocclusions

James E. Eckhart, DDS
Manhattan Beach, California

I have been involved with the development of the MARA (mandibular anterior repositioning appliance) since its conception in 1995 and find that it works well for correcting moderate and severe Class II malocclusions in children and adults. A fixed functional corrector fabricated at AOA/Pro Laboratory, the MARA is positioned in the molar area and is generally less bulky than the Herbst appliance for repositioning the mandible forward. Since it’s cemented to the teeth, compliance becomes a non-issue in children. The appliance encourages growth and bone remodeling and allows time for adjustment of muscle attachments.

While any Class II child or adult may be a candidate for the MARA, adult treatment may require appliance modifications. Adult treatment is dentoalveolar and the MARA can cause significant distal movement of the upper teeth without the need for palatal-holding arches. Even adult cases that otherwise would have warranted mandibular advancement surgery have been treated with the MARA with satisfactory results. Although the mandibular growth aspect of Class II correction in adults is presumed to be absent, there are still sufficient remodeling changes that occur to render the treatment effectual and timely.

Adult Side Effects & Clinical Solutions

Loosening of the lower first molars. The MARA is designed with a lower lingual arch that is sufficient in children to stabilize the lower first molars (Figure 1). Sometimes the lower first molars loosen as a result of pressure from the upper elbows contacting the distal of the lower arms as the patient bites forward into the corrected position. Adults experience more loosening than children because their muscle forces are greater. Because there is no mandibular growth in adults, their muscles naturally try to pull the mandible back.

Figure 1. The standard MARA, primarily used for children, is fabricated with a lower lingual arch.

Solution: Have the MARA fabricated without a lower lingual arch (Figure 2), and instead, place full braces on the lower teeth to stabilize the lower first molars. Place the lower archwire through the tubes soldered to the lower first molar stainless steel crowns.

Figure 2. A modified MARA is fabricated without a lingual arch.

Do not bracket the upper teeth during adult MARA treatment unless you want to...
advance the incisors or develop the upper arch. If this is the case, bracket the upper teeth 5-5. Do not place the archwire into the upper first molar tube because unwanted tip-back of the upper molars (which occurs during treatment) will cause extrusion of the anterior maxillary teeth. Bracket only 2-2 if the upper incisors require alignment for mandibular repositioning (Figure 3).

**Figure 3. Bracket 2-2 if the upper incisors require alignment for mandibular repositioning.**

**Spacing of the lower incisors.** Spacing of the lower incisors usually occurs in adults treated with a MARA fabricated with a lower lingual arch. When the molars move forward, the lingual arch can move against the incisors and cause them to flare.

**Solution:** Have the MARA fabricated without the lower lingual arch and place full braces on the lower teeth when the appliance is delivered (Figure 4).

**Figure 4. In an adult patient, a lingual arch (standard on the MARA) can cause spacing of lower anterior teeth when molars move forward.**

**Intrusion and tip-back of the upper first molars and extrusion of the upper second molars.** The arms of the MARA attached to the lower first molars push distally on the upper elbows, which hang down occlusally beyond the upper molar component. This can cause tip-back of the upper first molars and intrusion of the distal marginal ridges in addition to extrusion of the upper second molars (Figure 5).

**Figure 5. An unmodified MARA can extrude the upper second molars.**

**Solution:** Add occlusal rests from the upper first molar stainless steel crowns to the occlusal of the upper second molars (Figure 6).

**Figure 6. To prevent second molar extrusion or first molar intrusion, the MARA is modified with an occlusal rest.**

**“Even adult cases that otherwise would have warranted mandibular advancement surgery have been treated with the MARA with satisfactory results.”**

**Tendency for Class II relapse after MARA removal.** There is no clinical proof that an adult treated with the MARA has more tendency to relapse than a child; however, adult muscles are stronger and tend to continue to pull the mandible distally after the MARA is removed, even though tomograms show the condyles centered in the fossa.

**Solution:** Overcorrect the Class II to an edge-to-edge incisal relationship and maintain for at least a year. Take a tomogram at the end of one year. If the condyles have seated, remove the MARA. A severe Class II may take longer. As soon as the appliance has been removed, bracket the rest of the teeth and detail the occlusion. Again, the Class II may partially reappear during the finishing phase of treatment. If so, add Class II elastics.
Adult Cases May Require Special Lab Instructions

Jerry Engelbart, AOA/Pro
MARA Development Technician
Sturtevant, Wisconsin

Originally the primary candidates for the MARA appliance were children ages 7 to 15. Now there is a growing interest in adult treatment. As Dr. Eckhart has illustrated in the solutions he discussed, appliance modifications may be required for adult treatment. The correct method for you to communicate a modification is on the patient’s prescription. For example, you know the MARA’s standard design includes a lower lingual arch but you are treating an adult patient. Indicate on the special instruction section of the patient’s prescription to fabricate the MARA without a lingual arch. Also, if you plan to place brackets and archwires during treatment, it is important to indicate on the prescription the required archwire size (.018 or .022).

The MARA has been readily accepted into many practices as the appliance of choice for Class II correction. This acceptance has greatly influenced the development of design modifications that enhance the overall performance of the appliance. For example, it is cumbersome to secure the upper elbow of the MARA with a ligature tie through the eyelet attached to the inside of the vertical arm of the elbow (Figure 1). Dr. Eugene Simon has modified the elbow to include an extension wire with ball hook to simplify ligation. An .014 ligature wire can be used for strength and durability (Figure 2) or an elastic, which is efficient and easy to use. A ring of complimentary elastics will be provided with the appliance, if you make the request on your prescription.

As of January 2001, the following changes became standard features of the MARA:

1. Upper elbow modification simplifies ligation.
2. Vent or removal holes are no longer cut into the crowns unless requested.

The AOA/Pro technical support team is always available to answer questions regarding the design and performance of the MARA appliance. Call toll free (800) 262-5221.
Your patient’s smile is your best advertisement – a walking billboard that continues to market your practice long after treatment is completed. For this smile to send its best message, your patient’s teeth need to be white as well as straight. That’s why the finishing touch to your patient’s beautiful new smile should be tooth whitening.

Now from Ormco comes BriteFinish, a complete in-office and take-home tooth whitening system that combines a professionally administered in-office procedure with professionally directed at-home supplements. After just one visit, the power-whitening of BriteFinish will showcase your patient’s straight teeth and dazzling smile.

The BriteFinish power-whitening formula – in a 35% hydrogen peroxide, syringe-delivered gel – can remove even the most persistent stains caused by congenital, systemic, metabolic, traumatic or pharmaceutical conditions, including tetracycline stains. It is designed to work with increased efficiency using the Demetron Optilux 501 curing light. With its high-output bleaching mode, the 501 accelerates the bleaching effect, resulting in a two- to three-shade alteration in most dentitions with one application.

With minimal chair time, you can offer tooth whitening with immediate results that your patients can also augment at home for even greater effect in as little as five nights. Patients can use the take-home tray and gel whitening system for night- or daytime use in as little as 30 minutes or up to 8 hours at a time. Remember, the finishing touch to straight teeth is BriteFinish.

“There’s never a time when patients are more conscious of their teeth than when they first get their braces off.”

– Dr. Stephen Tracey, Upland, California
Lingual and Beyond

Hands-On Approach to Contemporary Lingual and Aesthetic Orthodontics
with Mario Paz, D.D.S., M.S.

Waiting to make the move into lingual? Here is your opportunity to learn from one of the most experienced orthodontists using lingual appliances today.

Dr. Paz possesses extensive clinical experience with lingual therapy – experience you can put to immediate use in the management of your lingual treatment.

Course Topics:
- History of the lingual technique
- Getting started with lingual/instrumentation
- Case selection criteria
- Diagnosis and treatment considerations
- Principles of lingual therapy – biomechanics
- Finishing cases, debonding and retention
- Marketing – communicating value to new patients
- Nonextraction treatment
- Troubleshooting cases
- Hands-on clinical experience
- Appointment sequencing
- Establishing team approach with cosmetic dentists and other referring specialists

Spring Lingual Course
April 30 - May 1, 2001
Orange, California

Fee: $1,050 ($500 nonrefundable registration). Includes continental breakfast and lunch each day. $550 for residents and orthodontic assistants. (16 CE units)

Fall Comprehensive Lingual Course
October 4-6, 2001
Marina del Rey, California

Fee: $2,150 ($1,000 nonrefundable registration). Limited to 10 participants. Includes continental breakfast and lunch each day. (20 CE units)

To register, contact Kaci Korkis at Dr. Paz’s office at (310) 822-4224.

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Adult treatment has never been easier, more convenient or comfortable.

Part No. 070-5252

Part No. 073-5012
Space Closure with Elastic Chain
Anterior gaps from missing or extracted incisors can also be closed using elastic chain attached to an .016 x .022 Copper Ni-Ti archwire. Figure 5a shows a patient with two missing maxillary lateral incisors after extraction of the persistent deciduous teeth. The length of the archwire is determined from measuring the setup model that has two fewer teeth. Initially the archwire will be too short clinically. It is engaged in the canines but only tied into the incisors with elastics without being fully engaged. Several weeks later, after the gaps have partially closed, the archwire can be tied in completely and the remaining space closure encouraged with elastic chain. The gaps closed completely after 7 months of treatment with an .016 x .022 Copper Ni-Ti archwire (Figure 5b).

Torque Control using Overcorrection in Archwire
Correcting incisor torque is desirable from the beginning of treatment, particularly in Class II, division 2 extraction cases. This can be achieved by bending an over-correction into the central incisor region of the first archwire. Figure 6a shows an .016 x .022 Copper Ni-Ti archwire with approximately 15˚ of overcorrected palatal root torque for the maxillary central incisors. Figures 6b and 6c show the progression of tooth movement after 7 months. Prior to bonding, the lower arch serves as a reference for analyzing the maxillary tooth movement. The central incisors were clearly torqued without increased overjet. Both canines were distalized on the archwire. The lateral incisors were aligned. The lateral open bite was closed. Neither vertical nor transverse bowing effects occurred despite the use of elastic chains on the flexible archwire.

In addition, Figures 6b and 6c show that frontal crowding in extraction cases can be resolved by distalizing the canines under archwire guidance using elastic chain attached to an .016 x .022 Copper Ni-Ti archwire. Using low forces, this size archwire is stable enough to prevent negative side effects.

Achieving Derotation with Lasso Elastic
In many cases a rotated tooth can be derotated by means of a lasso, a common lingual technique. If the teeth are simultaneously tilted, the bracket slot will not run on the same plane as the archwire, which will result in canting and prevent further correction. Figure 7a shows a lasso elastic on the lower right canine. The elastomeric chain was tied to the archwire mesial of the canine and run below the proximal contact to the buccal and distal of the tooth, then back to the bracket. The success of the correction was ensured by tying the archwire in completely with a wire ligature, softening the archwire with cryogenic spray (Figures 7b and 7c). After eight weeks, the tooth was fully derotated without reactivation of the lasso device (Figure 7d).

As you have seen through these examples and cases, the lingual therapy that I practice relies heavily on the efficiency of customized archwires. Because advancements have created better materials and
processes, we are able to give our patients highly effective economical treatment in less time than ever before. It may be time for you to take a second look at incorporating lingual therapy into your practice.

References