How can so many various arch forms exist? Obviously, archwire shapes have a direct influence on the dental arch form. If archwire shapes are to dictate the dental arch form with respect to average anatomy, a logical conclusion is that for the average patient, only one arch form would seem to fit best.

Orthos™ is an orthodontic appliance system derived from the analysis of skeletal and dental features using contemporary metrology. It is a systems approach that applies computer aided engineering (CAE) to the design of an occlusion and the ancillary orthodontic appliances. Critical components of this system are coordinated archwires (in appropriate sizes and compositions) that harmonize with the bracket system encouraging better results.

Prior archwire designs have been based on such principles as trifocal ellipses and catenary curves. In a nutshell, the trifocal ellipse theory is based on the shape of the egg. The principle here is that the egg is extremely resistant to collapse under pressure and,
therefore, should generate a stable arch form. Catenary curves describe the shape that a chain follows when suspended between two points. This has an opposite premise to the ellipse theory because catenary curves are based on tension rather than compression. As the illustration shows, although catenaries are a family of curves, many shapes can be generated by such procedures (Figure 1).

The dental arch forms differ from the shape of the archwire forms that produced them due to the influence of the brackets. This means that one needs to start with the dental arch forms and reverse engineer the brackets and archwire forms that would cause the desired dental shapes. With respect to stability, the quest for a broader smile has brought wider arch forms which seem to expand lower cuspids. Most studies have shown that expansion of the lower cuspids has an adverse effect on stability. The goals of any archwire shape are esthetics, function and stability, and while the public’s viewpoint on what is esthetic can change, the goals of function and stability should be relatively constant.

What makes Orthos archwire shapes unique is that they are derived from the skeletal and dental anatomy of typical orthodontic cases. In other words, the anatomy dictated the geometries of Orthos archwires, brackets and buccal tubes. Prior archwire shapes have their basis in an individual’s concept of the ideal arch form, and anatomy has not been given enough of a voice in their design. To understand Orthos archwire coordination, we will explain how one case is put together digitally. The archwires in the Orthos system represent an average of over 100 cases.

Design of Occlusion
To derive the Orthos arch forms and archwire shapes for a single case, we first look at the skeletal size and shape of the cancellous center of the mandible. Our basic premise here is that teeth should be aligned and contained within the limits of the mandibular bone. Anatomical factors seem to require that the preponderance of skeletal changes are made in the maxilla and only relatively small changes in the mandibular bone.

Images of the mandibular and maxillary models are input to the computer. A grid is placed over the mandibular image to divorce the dentition from skeletal features. Landmarks describe the size and shape of the center of the cancellous portion of the mandibular trough. This shape is referred to as ManTroff. It is the foundation for the digital design of occlusion. It allows the Orthos software to place the mandibular teeth in the center of the cancellous bone at the correct inclinations (Figure 2). An examination of the mandibular and maxillary dentition now takes place. After each tooth has been digitized, certain dental landmarks are identified. Several calculations take place and various dental planes are also constructed (Figure 3).

Figure 1. Catenary curves.

Figure 2. Occlusal view showing the mandibular trough or ManTroff.

Figure 3. Mandibular planes.
The mandibular teeth are now placed onto the ManTroff shape. The derivation of an equation called the Best Fit Buccal Cusp Equation (BFBCE) is required to continue the digital setup. The BFBCE describes the location of the cusp tips of the mandibular teeth. By this approach, the buccal cusps are caused to form a smooth arch reflecting the size and shape of the mandible. The BFBCE allows the software to develop other shapes that describe where key anatomical aspects of the maxillary teeth belong in relation to the mandibular teeth.

The BFBCE and its foundation, the ManTroff equation, form the structure upon which the maxillary dental arch forms will be built. With the digital construction of the mandibular occlusion complete, we now have an ideal setup to which the maxillary occlusion will be coordinated (Figure 4).

Overbite is established with respect to the cuspids. The shapes that describe where critical aspects of the maxillary teeth belong are used to position the teeth. By digitizing certain cephalometric landmarks, we can calculate the required cusp rise. We also calculate the cuspids’ relationships to the maxillary central and lateral teeth (Figure 5).

Once the occlusion is constructed through the second bicuspids, the maxillary and mandibular first molars are placed into the occlusion. Certain dental landmarks are identified on the maxillary first molar. It is rotated and translated on the BFBCE so that it occupies the least amount of space. Next, the mandibular first molar is rotated about its mesiobuccal cusp and translated along the BFBCE until it occludes with the maxillary first molar. The following occlusogram is produced (Figure 6).

The occlusion has now been digitally constructed. The skeletal and dental arch forms are known mathematically. The maxillary and mandibular molars are interdigitated and the dental arch forms are coordinated. The software now proceeds to the appliance design steps.

Appliance Design

The first step in appliance design is to position the mandibular archwire plane. The occlusogingival location of the mandibular archwire plane depends upon the maxillary tooth with the maximum overhang relative to the occlusal plane. Some clearance is added so that the brackets will not interfere with the maxillary teeth when in the finished occlusion. After the height of the mandibular archwire plane is calculated, representations of slotless (called vanilla) brackets are placed on each of the mandibular teeth (Figure 7).

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Figure 4. The 3D finalized mandibular occlusion.

Figure 5. Mandibular and maxillary overbite.

Figure 6. Mandibular and maxillary first molar occlusogram.

Figure 7. Mandibular archwire plane and bracket position.

Figure 8. Maxillary archwire plane and bracket position.
Since the maxillary teeth do not pose a bracket interference problem, the brackets can be positioned for ease of placement and gingival health. Typically, the maxillary archwire plane is located centrally on the dentition (Figure 8).

Now that the vanilla bracket bodies have been positioned, a smooth archwire must be designed so that it will pass through the bodies of the brackets (Figure 9).

Typically, we allow the computer to pick five equally spaced in-out locations within each bracket body for archwire derivation. Thousands of archwires are mathematically derived. Each is compared until the smoothest archwire that sweeps closest to the dentition is identified (Figure 10).

The Orthos bracket and archwire geometries are now known. The depth of the slot, the torque angle and the slot rotations are known, as is the positioning of the brackets on the teeth. The shapes of the archwires are described mathematically. Each archwire is composed of 28 tangential circle segments.

Results

The Orthos CAE software automatically coordinates the archwires. As has been shown, the occlusion is constructed independent of orthodontic appliances (Figure 11).

In truth, the archwires are dependent upon the skeletal structure and the occlusion. Since the occlusion is digitally constructed and the archwires are derived from that digital occlusion, by definition, the mandibular and maxillary archwires are mathematically coordinated (Figure 12).

One of the criteria for an ideal bracket is that it be as small as possible labiolingually. The Lowest Profile Appliance System is produced when the archwire sweeps as close to the dentition as is practical. Through clinical feedback and by studying the relationships of the various mathematical models used to define the dental and archwire shapes, it was determined that some brackets required an additional geometry. This configuration is called Rotation In Slot (RIS). Typically, with prior appliance designs, the base of the slot is parallel to the base of the bracket; with RIS geometry the base is not (Figure 13).

Also, in prior designs, the archwires were to maintain a uniform distance between the dental arch form and the archwire form. The criterion for Lowest Profile archwires is a smooth shape that

continued on page 16
Numerous treatment methods have been used for crossbite correction—rapid palatal expansion, quad helix appliances, W-arch appliances, thermally activated expansion devices, fixed appliance therapy and, in adults, surgical expansion in conjunction with expansion devices or orthognathic surgery. Rapid palatal expansion is often recommended for:

1. Correction of unilateral or bilateral crossbites.
2. Mobilization of maxillary sutures to facilitate correction of Class III midfacial deficiency.
3. Increasing maxillary arch width to increase arch length.
4. Increasing apical base width to facilitate posterior buccal root torque.
5. Reducing nasal resistance in an effort to normalize breathing patterns.

In the past several years, the use of bonded rapid palatal expansion appliances has become fairly popular. The main reasons for this are:

1. Reduced number of appointments—Conventional banded appliances require an appointment for separator placement. This is followed by a banding appointment with impressions and then final placement of the appliance. For the fabrication of the bonded appliance, an impression is all that is required, and the appliance is seated in the next appointment after fabrication in the laboratory.
2. Reduced posterior tooth tipping—This is a problem frequently experienced with banded RPE (Brust). This is important in reducing the amount of posterior buccal root torque needed to treat the orthodontic case and is attributed to the rigidity of the appliance framework.

3. Bite block effect to facilitate the correction of anterior crossbites—As described by McNamara.

Statement of the Problem

The downward and forward movement of the maxilla frequently seen with rapid palatal expansion is not desirable in certain cases. Is it possible, then, that this sort of movement can be counteracted to prevent the undesirable effects of rapid palatal expansion? There are treatment variations which may reduce these undesirable vertical movements during the expansion phase:

1. Placement of a high pull headgear or a vertical pull chincup during the expansion phase.
2. Use of posterior bite blocks during the expansion phase to minimize or negate the downward and forward movement of the maxilla during expansion.

In the mid 1980s we decided to test the hypothesis that bonded rapid palatal expansion appliances may indeed offer the possibility of a bite-block effect. The acrylic pads on the posterior occlusion may function very much like a functional appliance. How might this work? A look at the maxillary sutures (Figure 1) shows that they are oriented from superior to inferior and from medial to lateral. Logically, Rapid Palatal Expansion Appliance

by David M. Sarver, D.M.D., M.S.
Birmingham, Alabama

Dr. David Sarver received his dental training at the University of Alabama and his M.S. from the University of North Carolina. He serves as Clinical Associate Professor in the Department of Orthodontics, University of Alabama School of Dentistry, in the capacity of Adjunct Professor in the Department of Orthodontics. He has lectured and published extensively on facial esthetics, plastic surgery, orthognathic surgery and the computerization of treatment planning and prediction using video imaging. Dr. Sarver maintains a private practice of orthodontics in Birmingham.
lateral expansion would result in a tendency for the maxilla to be forced downward. Furthermore, these sutures are oriented so that expansion also propels the maxilla forward. In 1988, we published the results of 20 consecutive cases, which tested the hypothesis that bonded rapid palatal expansion may reduce or negate the downward movement of the maxilla. This was published in the American Journal of Orthodontics and Dentofacial Orthopedics in 1989. We used the following method:

1. The study used Wertz's cephalometric data as a control for the comparison of the data from the bonded appliance population.
2. The measurement system used by Wertz was then duplicated in our study so that direct comparisons could be made.
3. We then took the 20 consecutive bonded rapid palatal expansion cases and analyzed them just as Wertz had, allowing us to make direct comparisons with his data.

The purpose of this article is to review this study and illustrate how it is applicable to improving clinical practice.

Results of the Study
The statistically significant findings in the data comparison are graphically summarized in Figure 2. The most significant finding was that inferior and anterior displacement of the maxilla was lessened in the bonded appliance group. Other findings were:

1. There was a slight superior movement of the posterior aspect of the palatal plane. Downward and backward rotation of the mandible was negated.
2. The anterior aspect of the maxilla (ANS) had significant movement downward and posteriorly.
3. As the anterior maxilla moved posteriorly, there was an inferior and posterior movement of the central incisors.

The clinical significance of these findings is rather important. I would like to summarize the indications for bonded RPE for crossbite correction in the following cases:

1. Any case in which vertical problems need to be controlled.
2. Class II patterns in which a downward and backward rotation of the mandible is undesirable (for example, a mandibular-deficient profile or a long-faced patient).
3. Open bite patterns. With the bonded appliance, open bites tend not to worsen or may even improve because of the following factors:
   a. The mandible is prevented from rotating downward and backward.
   b. The posterior maxilla is intruded, which can result in rotation of the mandible closed.
   c. The anterior maxilla and its dentition continue vertical development, which results in bite closure.
4. Whenever the disocclusion effects of the appliance would be useful. For example, as McNamara describes, correction of anterior crossbite with midfacial protraction may be facilitated with bonded RPE. However, bonded appliances may facilitate Class III correction through the resulting forward movement of the maxilla (described in indications for banded appliances).

Indications for banded RPE in crossbite correction:
1. Class III skeletal patterns in which the malocclusion may be improved by either anterior movement of the maxilla or downward and backward rotation of the mandible.
2. Short lower facial heights of various skeletal types.

Appliance Construction
There is more than one way to construct, place and remove this appliance. The method described herein is the one that has evolved in my practice over the years, and is certainly not the only way to go.

The impression is taken and a working model is poured up. The height of contour is marked in pencil to allow the appliance to be fabricated to the height of contour – not gingival to it. The appliance pads are then constructed above the height of contour of the teeth.

When we first started using bonded rapid palatal expansion appliances, we were concerned that they would not be as retentive as banded appliances. The reverse proved to be true. The biggest problem (as many other orthodontists experienced) was the difficulty in removal of the appliances. Therefore, several steps are incorporated into the fabrication of the appliance to accomplish these three goals:

1. Reduce the strength of retention.
2. Maximize oral hygiene.
3. Make appliance removal as clean and...
as painless as possible.

We feel we accomplish this in appliance design by:

1. Not extending the appliance past the height of contour (Figure 3).
2. Waxing out the model interdentally to prevent the appliance from “snapping in” underneath the contact points.
3. Placing a debonding loop (also in Figure 3). This loop is designed to allow removal of the appliance with a vertical force against the occlusal surfaces of the teeth. This will be more clearly described in the removal section of this article.

Appliance Placement
The appliance is cemented utilizing a fluoride releasing composite, and we prefer using a material in which the composite is a blue color, allowing remnants to be identified and eliminated upon appliance removal.

The teeth are pumiced and then etched on the buccal and palatal sides to the height of contour (Figure 4). The composite is mixed and loaded into the bonding pads and the appliance is seated. Material is allowed to extrude through the occlusal holes and removed. Any material that extrudes above the height of contour is removed with a scaler. Of course, there are a variety of ways to etch and place the appliance via auto-polymerized or light-polymerized material. The main point is to keep the material above the height of contour, out of the interdental spaces. This allows the teeth to be cleaned with a toothbrush between the height of contour and the gingival margins.

The appliance is then equilibrated into place. We do not do a fine equilibration, since expansion will begin immediately, thus changing the occlusal relationships.

Appliance Removal
Grasp the debonding loop with a plier and use an outward motion with the plier pivoting on the bonding pad (Figure 5). The debonding loop creates a force on the occlusal surface of the posterior teeth, unseating the appliance directly to the vertical (Figure 6). Final cleanup is usually done with a scaler, with minimal use of a finishing bur to remove any excess. We recommend the use of a colored bonding material rather than tooth-colored material so that it can be visualized readily at the time of cleanup and eliminated. Admittedly, as in all bonded RPE cases, this method is not foolproof, and some cases require excessive cleanup procedures. However, this number is quite small.

Case Presentations
Treatment on open bite patterns – This 12-year-old female presented with bilateral crossbite and an open bite (Figure 7). Her skeletal pattern was dolichocephalic, with high mandibular plane angle and retrognathia. Crossbite correction was planned with rapid palatal expansion, and we decided against the banded appliance.
since a downward movement of the maxilla would cause downward and backward rotation of the mandible, resulting in:
1. Increased bite opening.
2. Worsening of the Class II relation.
3. Increased profile convexity.

The bonded expansion appliance achieved a 6mm expansion. The severity of the open bite actually diminished (Figure 8) after the expansion phase of treatment. The cephalometric superimposition (Figure 9) reflects that the bite closure occurred because:
1. The posterior maxilla did not descend vertically.
2. The anterior maxilla and maxillary dentition continued their vertical development, with the upper incisor moving inferiorly and posteriorly.

Finishing orthodontic therapy was successful from this point forward and a stable result was achieved (Figure 10). The use of banded appliances in Class III treatment - This 9-year-old was referred for consultation regarding his anterior and bilateral posterior crossbites (Figure 11). Skeletally, he had a low angle Class III pattern with mild maxillary insufficiency. Banded rapid palatal expansion was selected for his crossbite correction since:
1. The downward and forward movement expected from banded RPE would be helpful in improving the anterior crossbite and the Class III skeletal relationship.
2. The downward movement would also increase the lower facial height and help the Class III correction by producing a downward and backward rotation of the mandible.

The expected Class III improvement occurred (Figure 12) as a result of the expansion. Cephalometric superimposition (Figure 13) revealed a significant downward and forward movement of the maxilla, which resulted in correction of the anterior crossbite without any other treatment.

Summary
Expansion of the maxilla and maxillary dentition may be accomplished in many ways. The type of skeletal and dental pattern greatly influences the type of expansion chosen, and the type of expansion selected can greatly facilitate your overall treatment objectives.

Figure 7. This patient had bilateral crossbite with anterior open bite.

Figure 8. After expansion with the bonded appliance, the open bite was actually reduced, improving the chances of conservative treatment.

Figure 9. The posterior maxilla did not move downward while the anterior did, resulting in bite closure.

Figure 10. Final occlusal result.

Figure 11. This patient had bilateral posterior crossbite and anterior crossbite.

Figure 12. Expansion with the banded appliance resulted in correction of the anterior crossbite due to the downward and forward movement of the maxilla.

Figure 13. Cephalometric superimpositions illustrating the downward and forward movement of the maxilla with downward and backward rotation of the mandible.

A Treatment Coordinators’ Study Club—Benefiting TC and Doctor Alike

by The TC Study Club

“Wouldn’t it be great if the treatment coordinators had their own study club?” This is what Dr. Sandy Bigman said every time his office staff would go to an AAO, PCSO, or an Ormco practice development seminar. The idea was a good one and many of the treatment coordinators (TC’s) and doctors they conversed with agreed. Year after year, the consensus was that a study club would be a wonderful way for TC’s to network.

Starting the Study Club
Finally, we decided to follow up on the idea. In August 1993, Dr. Bigman’s treatment coordinator, BethAnn Snider, sent out a letter to the TC’s she had met at various meetings and to other offices she knew that used treatment coordinators. The letter outlined the positive exchange of ideas that had occurred between TC’s and asked if they would be interested in developing a study club. The response was tremendous! BethAnn called each one who responded and determined a central location, time and date for the initial meeting. The first meeting included introductions and discussions of guidelines for the study club. Some parameters were established that evening, and others at the next meeting.

The Objective of the Study Club
The purpose of forming a study club is to improve and enhance our skills. We all want to grow and evolve. The TC’s are responsible for case acceptance, so staying focused on what is and what is not successful is critical. When treatment coordinating skills are enhanced, performance improves and conversion rates increase.

The club members share ideas on systems and marketing and participate in problem solving and role playing. The new ideas are brought back to our offices. After discussing them with staff and doctor, the agreed-upon changes are implemented. Exchanging ideas regarding team effectiveness is also useful. We all want our practices to be role models on the leading edge of orthodontics.

Study Club Guidelines
1. The doctor must utilize the TC to their fullest potential.
2. A member must be an active TC in the practice for six months.
3. The size of the study club is limited to 10 participants.
4. All TC’s must be from different cities (and not too close).
5. Meetings are held quarterly.
6. Each TC takes turns facilitating a meeting and choosing its topic.
7. Any member missing three consecutive meetings loses their place in the club.
8. Speakers on a variety of topics are invited to our meetings to give 20- to 30-minute presentations.
9. Two TC’s from the same doctor are accepted for membership if they work at separate locations.
10. A TC leaving their current office and going to work for another orthodontist as a TC has priority over the new TC from the old office.
11. There is no fee for membership.
12. The study club is limited to orthodontic TC’s only.

What Does a Club Have to Offer a TC?
Numerous benefits for the TC’s result from participation in the study club. It improves self-confidence, increases motivation and heightens enthusiasm. The club offers a TC the opportunity to network with other TC’s, become better listeners and enhance their communication skills. TC’s are a self-directing group and generally thrive on learning, sharing, communicating and implementing. Study clubs provide an additional opportunity to further careers and reach personal goals in professional life.

How the Doctor will Benefit
Through networking with other practices, the club shares information regarding the building of relationships with colleagues, fees and better ways to matriculate new patients into the practice to increase case acceptance.

The Treatment Coordinator Study Club—An Idea Whose Time Has Come
This particular study club has given the TC’s involved a solid ground for support and growth. It is comforting and enlightening for us to discuss similar situations and hear how others have handled them. This is extremely valuable feedback. All of us value the opportunity to grow professionally. We believe that, “What you think about, you bring about.” It is our intention to be successful! This study club wants to think about success, talk about success, plan for success and experience many successes within all our offices. The bottom line: being part of this study club nurtures our success! We encourage you to consider this idea in your orthodontic community and further your success as well.
Clinical Insights on Copper Ni-Ti

A Clinical Comment on Copper Ni-Ti

by Charles R. Sager, D.M.D., M.S.
Madison, New Jersey

I have found Copper Ni-Ti™ wire to be a valuable addition to my orthodontic technique. I am often able to use it (35° - .017 x .025 or .019 x .025) as an initial archwire. I find it easy to handle and easy to insert; thus far, patients have been very comfortable during the initial tissue reaction period. All my patients, especially adults, seem delighted by the explanation that these are temperature-activated archwires that are almost dead soft in the hand but quite resilient at mouth temperature. We frequently have the assistant hand them a bent demonstration wire which they are asked to dip into a cup of warm water. The instantaneous straightening of the archwire is a good object lesson and seems to increase the patient's awareness and appreciation of the process of wire placement. In the majority of cases, I am able to use rectangular wire from the outset or within a few weeks of bracketing. As of this writing, we have had no breakage of these archwires. It is quite easy to place crimpable hooks for elastics or for hook-on anterior headgear. I also use these as tiebacks when second bicuspids have not yet been banded. A crimpable stop with a slit or a low profile button would be a better way to do this, but none exist as yet. I have used screw-on stops, and while they also work, a crimpable stop that is easy to tie back would be an improvement.

It is difficult or impossible to place first or second order bends in these archwires with the usual bending techniques. However, if one uses the paired (left and right) ETM 130 A pliers, it is quite simple to place these bends, and first order bends can be easily placed without removing the archwires.

Most people who use this wire probably have learned the trick of cooling the archwire in an area where bracket engagement may be very difficult. I use ethyl chloride sprayed on a cotton applicator and then held onto the otherwise already ligated archwire. It is surprising how well this works. The ends of the archwire can be made dead soft with the flame of a match if one wishes to bend the archwires down behind the buccal tubes. For the more adventurous, this is often an acceptable substitute for tying back with a metal ligature.

In summary, this seems to be a nice new archwire which often allows comfortable placement of rectangular archwires very early in treatment.

Dr. Charles Sager, a diplomate of the American Board of Orthodontics, maintains a private practice of orthodontics in Madison, New Jersey.
Copper Ni-Ti Down Under

by Alan Pollard, M.D.Sc.
Melbourne, Australia

was fortunate enough to trial Copper Ni-Ti™ in September 1993. Chiquita is the first case in which I used the wire and she is now, 14 months later, ready for deband. Chiquita was a mild Class II Div 1 mesofacial case with approximately 5mm of crowding in maxillary and mandibular arches. I decided to treat her case non extraction with cervical headgear to correct the Class II molar relationship.

This type of maloclusion suits Copper Ni-Ti, minimal crowding, non extraction, where the clinician wishes to maintain good torque control with full bracket slot engagement in those early months of alignment. I used 16x22 wires with a 35° transition temperature for both arches.

The wire makes a most amazing first impression – you can tie it right into the slot. Make sure that the wire is cool enough to stay in the plastic phase during tie-in. I use the triplex spray as required. I’m sure that some of you will have more ingenious methods for cooling. (Afterwards, I still get a kick out of showing Mums and Dads this incredible memory wire regaining its shape under a warm tap.)

You must tie the wire right into those rotated wings to achieve the rapid derotation of the 22 achieved in two months. Don’t be concerned about wire deformation. It will just bounce right back into shape once it reaches transition temperature.

Both my first and second patients greeted me at the second visit with the claim that they had suffered no pain with this new wire. After a further 12 months of using Copper Ni-Ti, I can safely report that we haven’t quite reached pain-free tooth movement but there is no doubt that gentle forces are at work with this new wire material.

Chiquita had upper and lower Copper Ni-Ti wires in place for nearly six months and by that time I had completed Class II molar correction. Copper Ni-Ti made this case embarassingly easy to treat. The next wire change was straight into 16 x 22 SS archwires with extra labial root torque on upper lateral incisors. Final archwires followed soon afterwards.

Dr Alan Pollard received his M.D.Sc. from the University of Melbourne, Australia, where he has served as a senior clinical tutor. He works in a private orthodontic practice in Melbourne with three associates. His other major interest is in computer imaging and multimedia presentation.
To this date, I have only used the rectangular form of this wire. I still use a conventional Ni-Ti® round wire for alignment in most extraction cases. However, I will choose a rectangular Copper Ni-Ti to limit lingual collapse of lower anteriors during the alignment phase in a deep bite case.

Like any nickel titanium wire, vertical and tranverse arch control is Copper Ni-Ti’s biggest weakness. Don’t expect this wire to expand those buccal segments. Its strength is in levelling, derotating and unravelling crowded teeth. Use it for the purpose for which it was designed.
Time is an increasingly precious commodity, not only to us but also to our patients. To gain a deep appreciation of that fact, you need only to listen at your appointment desk for awhile to the negotiations that take place over the scheduling of a simple appointment. It goes without saying that anything having the potential to reduce patient visits to the office and reduce “chair time” for the doctor should seriously be considered for integration into the treatment process. Ormco’s new copper nickel titanium wires are such an item.

Copper Ni-Ti™ wires are the culmination of an amazing evolution in orthodontic wires. Orthodontists originally had to vary the diameter of stainless steel wires in order to obtain different levels of force. The next step in the evolution brought us multiple-stranded stainless wires along with heat treating. We then were given the opportunity to vary force levels by using wires of different metallic alloys. This latest innovation on the evolutionary scale gives us the opportunity of choosing the force level by choosing the temperature at which the wires will deliver its optimum force level. This new technology has the advantage of lowering patient discomfort, reducing patient visits and shortening some appointments, while allowing the orthodontist more control over force levels and mechanics during the early phases of treatment.

Copper Ni-Ti wire often allows the placement of full-size rectangular wires at the initial banding appointment. In Phase 1 treatment, this may be the only wire necessary! Figure 1 shows a 35° Copper Ni-Ti wire placed initially at a Phase 1 banding. Even though it is a .019x.025 wire, it is nearly fully engaged. Flexible tubing sleeve is added to the buccal segments to reduce irritation of the buccal mucosa (Figure 2). If additional arch length is needed, open coil springs can be added in place of the flexible tubing or a split-tube crimpable stop can be inserted against the first molar with the wire slightly advanced (Figure 3).

Dr. Randy Moles received his dental and orthodontic training from Marquette University, where he has served as Associate Professor of Orthodontics and as a guest lecturer. He has been active in the research and development of new orthodontic products and has lectured and published in the areas of TMD and practice management. Dr. Moles is engaged in the private practice of orthodontics in Racine, Wisconsin.
Visit intervals can be increased from four or five weeks to eight weeks or more as the Copper Ni-Ti continues to work. If full engagement is not possible at the first visit, it becomes a simple matter to retie the wire for full engagement at the next visit (Figure 4). If extended treatment intervals are used, it is appropriate to use wire ligatures, since elastomerically ties will fatigue and may be lost in the interim. Figure 5 shows final alignment six months later, after using only this wire.

If intrusion of anterior teeth is necessary to reduce the overbite, intrusion springs of .017 x .025 stainless steel wire can be added from the first molar buccal tube (Figure 6). They are activated by bending the arms so that they rest well up into the vestibule and then hooking them over the archwire. One very efficient method is to place a .017x.025 Reverse Curve Ni-Ti® either as an initial overarch or fully engaged once alignment has taken place (Figure 7).

If advancement of the incisors is not desired, the wire can be tucked tightly behind the first molars. Because of the significant flexibility of these wires and the long span from molar to lateral incisor, it is always necessary to flame the end of the wire and then tuck a few millimeters of it behind the molars. Copper Ni-Ti wire is an extremely useful addition to the armamentarium of the orthodontist. He can make the patient happier by reducing discomfort. He can make the parent happier by reducing the number of trips to the office and he can make both himself and his staff happier by reducing the work load.

**Why Copper?**

Since their recent introduction, Copper Ni-Ti™ archwires have enjoyed high visibility and a dramatic level of acceptance around the world. This has generated a lot of speculation and questions from both doctors and competitors as to the rationale for incorporating copper into a nickel titanium alloy. The simple, empirical response from the rapidly growing number of orthodontists using the wire is that it improves performance, as demonstrated by the experiences of our contributing clinicians.

From the beginning, the objective was to improve the performance of heat-treated nickel titanium archwires. We wanted to enhance the unloading (tooth-moving) forces characteristic of high-quality nickel titanium wires while reducing the loading force required for ligation. The load/deflection rate of nickel titanium wires also is important—the softer the material, the easier it can be manipulated. The addition of copper improves the performance of nickel titanium wires in these two vital categories as well as providing additional benefits.

Manufacturing nickel titanium wires is tedious, especially if you insist on building in a consistent heat transformation temperature. Consistency is extremely important because it is the austenitic finish temperature A(f) that determines the force of the wire. The addition of a small percentage of copper to the nickel and titanium alloy provides a more precise material to work with, allowing us to set a tightly controlled heat transformation temperature. Our plus or minus 2°C tolerances from the A(f) temperature ensure consistent performance, unlike previous temperature transformation wires with widely fluctuating, unpredictable activations (and correspondingly unpredictable treatment results).

In addition to the beneficial effect of copper, Copper Ni-Ti consistency and predictability also result from rigid quality control of the heat treatment operations performed on Copper Ni-Ti—arch form set, annealing temperature setting and heat treatment transformation temperature setting. In short, proper choice of materials and procedures plus tight standards and attention to detail underlie the superior performance of Copper Ni-Ti. You place these same demands on yourself in providing the highest quality treatment for your patients. You deserve this highest standard of performance from your archwires.

continued on page 19
remains close to the dentition (Figure 14).

The RIS configuration does not “rotate” the tooth. When the archwire is designed to sweep close to the dentition, some type of geometrical compensation is required. The RIS geometry is designed to accommodate the Lowest Profile criteria. The RIS geometry does, in conjunction with the archwires, compensate for first order discrepancies. The Lowest Profile design parameter has significantly reduced the in-out (first order) dimensions of the mandibular anterior brackets (Figure 15).

Figure 14. Comparison.

Figure 15. In-out comparison.

Summary

How can so many various arch forms exist?

There is such a multiplicity of arch forms that many clinicians are justifiably cynical about the merits of any particular form or system of forms. Those who have strong beliefs in specific forms are often oriented toward either an aesthetic goal, e.g., the currently popular broad arch/smile, or an attempt at stability, e.g., the Brader arch form with a relatively narrow anterior shape.

The goals of any archwire shape are esthetics, function and stability. While the publics viewpoint on what is esthetic can change, the goals of function and stability should be relatively constant. If archwire shapes are to dictate the dental arch form with respect to average anatomy, a logical conclusion is that for the average patient only one arch form would seem to be the best fit. It also follows that the archwires and brackets must work in harmony to produce the desired dental arch forms. One needs to start with the dental arch form and reverse engineer the archwire shapes and brackets geometries that would cause the desired dental arch forms.

Pre-adjusted appliances have brought their measure of benefits to the profession, but they have been limited by a nonsystematic approach to appliance design. Orthos is a dramatically improved but still an average pre-adjusted appliance system, not an individually customized appliance system; as such, there will still be some wires to bend and adjustments to make. What makes Orthos archwires different is that they are derived from the skeletal and dental anatomy of typical orthodontic cases and are designed to work in conjunction with Orthos brackets. Prior archwires have their basis in an individual's concept of the ideal arch form, and anatomy has not been given enough consideration in their design.

This article has focused on the rationale for the Orthos arch form design, the coordination of the arches and the necessary role of a systematic approach to orthodontic appliance design. In the future, other articles will describe the rationale for specific design aspects of the system and their resulting benefits to the busy clinician.
side consequences of the limitations of the technology of the time. The Orthos appliance system provides a dramatic resolution to these vexing problems while achieving optimal occlusion with the greatest clinical efficiency.

**Problem: 1st order discrepancies and placement difficulties with lower anterior brackets.**

Conventional lower anterior bracket labio-lingual profiles make placement difficult in crowded or rotated cases, frequently necessitate 1st order bends mesial to lower cuspid brackets, cause occlusal interference and create hygiene problems.

**Orthos Solution:**
Rotation is cut into the slot of lower cuspid brackets and the shape of the archwire is adjusted to sweep close to the tooth surface, allowing a dramatic reduction in the profile of the lower incisor brackets. The Rotation In Slot (RIS) geometry does not rotate the tooth, but does compensate for the 1st order discrepancies in conjunction with the archwires.

**Problem: Dumping of lower posterior segments.**

Conventional straight wire brackets are designed to be placed at the occluso-gingival mid-point of the tooth, where the opposing dentition is likely to interfere.

**Orthos Solution:**
The Orthos system was designed by recalculating optimum appliance geometry based on "typical" clinical placement rather than "ideal" positioning. Torque values were reduced in the mandibular posterior segments, resulting in decreased lingual crown inclination as well as improving 1st order relationships.

**Problem: Improper lower anterior root alignment.**

Panoramic views of finished cases reveal uneven root spacing.

**Orthos Solution:** Progressive distal tip is built into all lower anterior brackets to achieve improved uniformity in root spacing.

**Problem: Uneven proximal contacts in lower posterior segments.**

Marginal ridge contacts are not level and root alignment is uneven.

**Orthos Solution:** Lower bicuspid brackets are designed with distal root tip to enhance balanced proximal contacts and root alignment.

**Problem: Difficult to rotate upper molars adequately and interdigitate them with lowers.**

Finished cases often show upper molars not rotated sufficiently to occupy minimal arch space and/or fail to occlude properly with lowers.

**Orthos Solution:** Orthos upper and lower molar tubes are designed with optimum distal rotation. Upper molars are rotated to occupy the least amount of space in the arch. At the same time, lower molars are positioned with respect to generally accepted centric occlusal landmarks, resulting in improved molar interdigation.

**Problem: Height discrepancies between marginal ridges of upper 2nd bicusps and molars.**

*Patent pending*
Upper 2nd bicuspids don’t relate properly to adjacent and opposing teeth. **Orthos Solution:** Distal root tip (4°) is incorporated into the upper 2nd bicuspid brackets as determined by recent studies.

**Problem:** First order bends consistently required distal to upper 2nd bicuspids. Insufficient thickness of upper 2nd bicuspid causes upper 1st molar to rotate mesially upon initial wire engagement (especially true with non-adjustable nickel titanium alloys), causing an increase in Class II tendency. Upper 2nd bicuspid moves buccally, opening the bite and further magnifying Class II condition. 1st order bends are typically required between maxillary bicuspids and molars to alleviate this problem. **Orthos Solution:** Computer analysis of dental anatomy confirms that maxillary 1st bicuspids are larger than maxillary 2nd bicuspids. The Orthos system incorporates a thicker 2nd bicuspid bracket that better synchronizes with the 1st bicuspid and molar.

**Problem:** At end of treatment, dangling lingual cusps cause balancing interferences. Maxillary posterior segments do not remain upright during expansion mechanics and can compromise occlusion as a result of balancing interferences. **Orthos Solution:** Moderately increased buccal root torque on the upper posterior segments helps keep them upright—particularly accommodating to nonextraction mechanics.

**Problem:** Difficulty achieving upper and lower arch coordination, especially during finishing. **Orthos Solution:** Dr. Andreiko’s preceding article describes how Orthos arch forms and brackets are computer-derived from skeletal analysis and integrally designed to coordinate the dental arches, optimizing clinical performance.

**Problem:** Frequent bicuspid bond failures necessitate rebonds or falling back to banding. Because of an unacceptable incidence of bond failure, almost one-half of U.S. orthodontists still resort to banding lower 2nd bicuspids, and a sizable number still band lower 1ststs and upper 1st and 2nd bicuspids. **Orthos Solution:**Ormco’s patented Optimesh™ coating is applied to all Orthos bases, increasing bond strength by over 35%. For additional bond strength on bicuspids, gingivally-offset bicuspid brackets with the pad extended occlusally to increase bond area are available as an Orthos option. The bracket is placed on the gingival section of the larger pad to be in correct alignment. The extended pad results in a dramatic increase in bond strength, since the occlusal third of the tooth is easier to etch and not as subject to contamination.

**Orthos Appliance Specifications**

The Orthos System is available in .018 and .022 Mini-Diamond® Optimesh™ brackets with distogingival hooks optional on cuspids and bicuspids and with optional gingivally offset bracket placement on occlusally extended bicuspid bases. A full range of 1st and 2nd molar buccal tubes (single, combination, double and triple; convertible and terminal) is provided. Buccal tubes are available on Optimesh pads or can be ordered prewelded to any Ormco molar band. Single-patient kits are available as a convenient option.

Orthos System archwires are available in popular sizes in Turbo™ Wire, stainless steel, TMA®, Ni-Ti®, and both 35° and 40° Copper Ni-Ti®. For additional information or for assistance in ordering the Orthos Appliance System, please contact your Ormco representative or distributor.
Matching Copper Ni-Ti™ Selection to Early Treatment Goals

27°C Superelastic Copper Ni-Ti
27°C Copper Ni-Ti generates forces in the high range of physiological force limits and produces constant unloading forces that can result in rapid tooth movement. Engagement force is lower than with other superelastic wires because of the lower loading forces built into the copper alloy; at the same time, unloading force levels are comparable to traditional superelastic nickel titanium wires.

35°C Thermo-Active Copper Ni-Ti
35°C Copper Ni-Ti generates mid-range, constant force levels when the wire reaches mouth temperature. Early ligation is easier with full size archwires due to the lower loading forces. Unloading forces are higher and more sustained than with other shape memory wires when the wire reaches body temperature. When earlier engagement of full-size wires and sustained unloading forces at body temperature are desired, 35°C Copper Ni-Ti is the ideal wire.

40°C Thermo-Active Copper Ni-Ti
40°C Copper Ni-Ti provides intermittent forces, being activated only when the mouth temperature exceeds 40°C. It is useful as an initial wire and can be used to engage severely malaligned teeth (such as high cuspids) without creating damaging or painful levels of force or unwanted side effects. It is also the wire of choice for patients scheduled for long intervals between visits when control of untoward tooth movement is a concern.

Availability
Copper Ni-Ti is available now in both the popular Broad Arch Form and the new Orthos™* Arch Form (both forms in small and large sizes of uppers and lowers).

27°C*: .014, .016, .018, .016 x .022, .017 x .025, .019 x .025

35°C: .016, .018, .016 x .022, .017 x .025, .019 x .025

40°C: .016 x .022, .017 x .025, .019 x .025

For order information on Copper Ni-Ti, see Page D of the Center Section.

*The Orthos Arch Form is not available in 27°C Copper Ni-Ti archwires, but is available in traditional superelastic Ni-Ti archwires.
How To Order: Phone (800) 854-1741, (818) 852-0921 or your Ormco representative. Fax (818) 852-0941. Or mail this form to: Ormco Corporation, 1332 South Lone Hill Avenue, Glendora, CA 91740-5339. Be sure to provide name and address.

.110 Color Power O’s
Buy 4 packs - get 4 packs free.
Any mix or colors; order 8 packs or more (even #s) and half will be FREE!
1,000 per package (20 modules/50 per module). Reg. $37.50/pk.
Indicate quantities: ____Purple; ____Blue; ____Black; ____Pink

Copper Ni-Ti™ Archwires (10 Kleen Paks /pk, min. 2 packs for discount)
Reg. $49.44/pk, Now $32.14/pk
Check arch form and indicate quantities: □ Broad Arch; □ Orthos Arch*

Kodak Film Products*

*Partial listing. Ormco carries the complete Kodak extraoral line.

Orthos™ System Offer
Significant introductory discounts on the Orthos appliance, archwires and positioning gauges are available. Please contact your Ormco representative for assistance with your Orthos System selections.

Waterdist-Stat - $254.00
Indicate no. units ordered:_____

TMA® Compression Springs
Three 7-1/2" lengths/pk

Open Coil Spring
Reg. $35.00, Now $26.25
Indicate no. of packs: Light _____ Medium _____ Heavy _____

Stop-Wound Coil Spring
Reg. $45.00, Now $33.75
Indicate no. of packs: Light _____ Medium _____ Heavy _____
Variable modulus mechanics revolutionized archwire selection; now they bring a sorely needed mid-range force to spring mechanics. New TMA® Compression Springs provide an ideal force for many clinical requirements, including molar distalization. Higher initial force moves molars more efficiently than nickel titanium springs, and a more level unloading force sustains movement better than stainless steel. TMA produces approximately 40% greater force than nickel titanium alloys and has 42% of stainless steel's stiffness and twice its working range—ideal properties for open coil and stop-wound coil spring applications.

TMA Springs are available in three force ranges in both open coil and stop-wound configurations. They generate adequate force to initiate tooth movement and sustain it, without the trauma and abrupt drop-off of force encountered with stainless steel. And they provide the logical next step up the force ladder when nickel titanium springs are inadequate for the clinical situation. The absence of nickel in TMA yields another benefit for nickel-sensitive patients.

Force ranges, wire diameters and coil internal diameters for both open and stop-wound coil springs are:

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Both open and stop-wound springs are provided as three 7½" lengths/pack. Order information for TMA Springs is provided on Page D of this Center Section.

### Relative Modulus

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### In Response to Your Requests...

**.110 Color Power O’s**

For ligating smaller brackets, .110 Power O’s are now available in four of our most popular colors—Purple, Blue, Pink and Black. Ormco Color Power O’s offer the quality and design advantages of Ormco’s gray and clear Power O’s—improved fit and lower decay rate—plus exciting, durable patient-pleasing colors. Available in packs of 1,000 Power O’s (20 trees/50 per tree). See Page D of this Center Section for order information.

Attention Treatment Coordinators

BethAnn Snider and Laurie Agnello invite you to join them at the Staff Round Table Discussion Breakfast on Monday, May 15, at the AAO Annual Session in San Francisco. Their topic for discussion will be “Creating an Orthodontic Treatment Coordinator Study Club in Your Area.” Preregistration is required and seating is limited, so please register early.
We are pleased to announce that our popular CD-i disc, Interact Consult, has been awarded both a Gold and Silver Medal at the recent CD-i Association (CDiA) competition and a Silver Medal at the New York Festival. Both events are prestigious venues for the demonstration and evaluation of new multimedia products.

The Gold Medal from the CD-iA is especially exciting for you, our customer, because it was awarded for the “best presentation to market services to customers.” The judges, experts in the multimedia field, recognized that the information contained on the disc is invaluable in enrolling new patients to your practice.

In both competitions, Consult won over organizations important in the multimedia field, including Microsoft, Sony Electronics, Philips and McGraw Hill whose discs include Encarta 1994 and The Halderman Diaries: Inside the Nixon White House, to name two. We’ve been told that among this notable company, the judges were all asking, “Who is Ormco?” We’re extremely proud and honored to add Ormco’s name to this prestigious list of organizations.

We would also like to pass along our hearty congratulations to SimStar, our partners in developing and programing Consult.

As distinguished as these awards are, our greatest recognition comes from customers who have found the system to be a tremendous asset to their patient enrollment efforts. Here are some of those accolades:

“Consult makes the difference when patients are shopping around. I may be making the same recommendations as two other doctors, but Consult helps them understand the process and I land the case.”

William L. Schmohl III, D.D.S.
San Rafael, California

If you have not seen what all the excitement is about, call your Ormco sales representative today to schedule a demonstration. Or call our Practice Enhancement line at (800) 854-1741 x 777 to speak with someone about Consult or to receive a free preview video tape. We invite you to join in our celebration by putting the power of Interact-Consult to work for you.

Got an Old Panographic Unit? Want a New One for Around $300.00?

With Kodak T-Mat™ Film and Lanex™ Intensifying Screens, you can upgrade your old panographic unit to get the same great results that new machines deliver—better images with exceptional sharpness and quality. Kodak T-Mat Film and Kodak Lanex Intensifying Screens also team up to cut radiation exposure as much as 50%—and save up to 40% over what you may use now. This combination lets you double load and get two radiographs—you don’t have to make duplicates.

Ormco is proud to carry the Kodak dental line to make it easier for you to obtain their outstanding products. For fast, dependable service, just phone, fax, mail in your order on the Center Section order form, or contact your Ormco representative. Call (800) 854-1741 or fax (818) 853-0941. Order information for Kodak T-Mat Film and Kodak Lanex Intensifying Screen is provided on Page D of this Center Section.
With the popular response to Trimline First Molar Bands, Seconds were sure to follow. And what an act to follow! Now available in both uppers and lowers, Trimline Second Molar Bands incorporate many of the design characteristics responsible for the success of the Trimline Firsts:

• Straight, shorter proximal walls facilitate fast, easy seating.
• Precise size gradation of buccal and lingual cusp indent locations provides improved buccal tube placement and a better fitting lower second band.
• Upper second incorporates a precise buccal groove to facilitate appliance positioning and band seating; increased disto-occlusal contouring is designed to eliminate overhang and associated burnishing.
• Designed to come to a positive stop to reduce rocking—fits securely at the marginal ridges and height of contour with minimum gingival impingement.
• Balanced stiffness and adaptability.

Available in 32 sizes for uppers or lowers—clearly identified by laser markings.

Peerless cast tubes complete the equation for the ideal molar assembly. Ormco casting technology allows not only increased strength, but also greater freedom of design to produce smaller precision tubes. Since the size of Peerless’ weld flanges is reduced, much better attachment to the band is possible, preserving band anatomy for best tooth fit and retention.

Worldwide demand for Peerless tubes is answered by Ormco’s production of distinct types of molar bands that accommodate the wide range of preferences of band fitting, adapting and seating characteristics.

Trimline Second Molar Bands are provided in Sampler (200 bands), Professional (400 bands), and Master (800 bands) Kits, with bands distributed by popular usage. To order or for additional information, please contact your Ormco representative or distributor.

Waterdist-Stat...Ideal for Statim and Other Equipment Requiring Distilled Water

The advanced Waterdist-Stat turns tap water into purified distilled water quickly and inexpensively. It’s sleek, portable, compact and easy to use—plug it into any 110V outlet, fill with tap water and turn it on; no plumbing or wiring is required. First the patented distillation technology flash vaporizes tap water, killing and removing contaminants such as bacteria, viruses, particles, dissolved solids, heavy metals and volatile organic compounds. Then the distilled water is passed through an advanced carbon filter system to provide 99% pure, fresh water.

The Waterdist-Stat will produce all the purified water necessary for sterilization, “closed water” delivery systems, ultrasonic cleaning and any other general water use. It is fully automatic and comes with a limited one-year warranty. The 10"w x 10"d x 12"h unit weighs only 8 pounds and produces approximately 3 qts. in 4½ hrs. See Page D of this Center Section for order information.
We are pleased to announce that our popular CD-i disc, Interact Consult, has been awarded both a Gold and Silver Medal at the recent CD-i Association (CDiA) competition and a Silver Medal at the New York Festival. Both events are prestigious venues for the demonstration and evaluation of new multimedia products.

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“We can always use typodonts or your hands to show tooth movement, but if patients can visualize the process, they understand it better - and Consult is a wonderful visual tool.”

Jane Cano
Treatment Coordinator
Practice of A. Paul Serrano, D.D.S.
Phoenix, Arizona

“Consult makes the difference when patients are shopping around. I may be making the same recommendations as two other doctors, but Consult helps them understand the process and I land the case.”

William L. Schmohl III, D.D.S.
San Rafael, California

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The Winners–AEZ/Titanium Instruments, New Lightweight Champions of the World

Half the weight of stainless steel instruments, AEZ/Titanium instruments provide easier handling with a comfortable, lighter feel. They have a weight-to-strength ratio second to none. Thermal-sprayed titanium tips are built to last – harder than tips of conventional steel pliers. Corrosion and erosion resistant, AEZ/Titanium instruments provide great value with a prolonged lifetime through rigorous sterilization procedures. Order information on the three popular pliers–How, Adhesive Removing and Weingart Utility–can be found on Page D of this Center Section.
With the popular response to Trimline First Molar Bands, Seconds were sure to follow. And what an act to follow! Now available in both uppers and lowers, Trimline Second Molar Bands incorporate many of the design characteristics responsible for the success of the Trimline Firsts:

- Straight, shorter proximal walls facilitate fast, easy seating.
- Precise size gradation of buccal and lingual cusp indent locations provides improved buccal tube placement and a better fitting lower second band.
- Upper second incorporates a precise buccal groove to facilitate appliance positioning and band seating; increased disto-occlusal contouring is designed to eliminate overhang and associated burnishing.
- Designed to come to a positive stop to reduce rocking—fits securely at the marginal ridges and height of contour with minimum gingival impingement.
- Balanced stiffness and adaptability.
- Available in 32 sizes for uppers or lowers—clearly identified by laser markings.

Peerless™ cast tubes complete the equation for the ideal molar assembly. Ormco casting technology allows not only increased strength, but also greater freedom of design to produce smaller precision tubes. Since the size of Peerless’ weld flanges is reduced, much better attachment to the band is possible, preserving band anatomy for best tooth fit and retention. Worldwide demand for Peerless tubes is answered by Ormco’s production of distinct types of molar bands that accommodate the wide range of preferences of band fitting, adapting and seating characteristics.

Trimline Second Molar Bands are provided in Sampler (200 bands), Professional (400 bands), and Master (800 bands) Kits, with bands distributed by popular usage. To order or for additional information, please contact your Ormco representative or distributor.

Immediate Seating Now Available...
No Waiting for Trimline™ Second Molar Bands

Simplified Crown Removal for Herbst Users

Almost all clinicians now select crowns rather than bands for the Herbst appliance since they hold up far better, but this strength and stability can make removal difficult. The AEZ® Chastant Crown Remover* (in conjunction with the use of an inverted cone bur to cut an occlusal window in the crown) greatly facilitates the removal procedure. The occlusal positioning beak has a smooth surface that has been shaped and sized specifically for use in removing crowns. Together with the opposing beak that grasps the lingual edge of the crown, solid purchase is achieved, direct lifting force can be applied and potential for damaging the tooth minimized. Order information for the Chastant Crown Remover is shown on Page D of this Center Section.

*Designed by Dr. Robert B. Chastant
Order Information

Descriptions and catalog numbers of products introduced or discussed in this issue are provided to facilitate your ordering. Please contact your Ormco representative or distributor for additional information.

AEZ® Titanium Instruments
- How Plier 803-2408
- Weingart Utility Plier 803-2401
- Adhesive Removing Plier 803-2410
- Titanium Nitrite-Coated Replacement Tip (1) 803-0976
- Replacement Pads (3) 803-0063

Orthos® Order Information
- Part numbers for Orthos brackets, weldable and bondable tubes, positioning gauges and archwires are provided in last quarter's Clinical Impressions, Vol. 3, No. 4.

.110 Color Power O’s
- 1,000/pkg (20 modules/50 per module)
- Purple 640-0150
- Blue 640-0152
- Pink 640-0153
- Black 640-0154

TMA® Compression Springs
- Open Coil Spring
  - Light 221-0901
  - Medium 221-1001
  - Heavy 221-1101
- Stop-Wound Coil Spring
  - Light 222-0901
  - Medium 222-1001
  - Heavy 222-1101

Copper Ni-Ti™ Archwires (Orthos® Arch Form, Packs of 10)

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Copper Ni-Ti™ Archwires (Orthos® Arch Form, Packs of 10)

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Copper Ni-Ti™ Archwires (Broad Arch Form, Packs of 10)

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# Lecture/Course Schedule at a Glance – Through June 1995

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<th>Date</th>
<th>Lecturer</th>
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<tr>
<td>3/17-19</td>
<td>Kyoto Takemoto</td>
<td>Rome, Italy</td>
<td>Dr. Giuseppe Scuzzo; Dr. Scuzzo 39-6-568-5862; Lingual Orthodontics*</td>
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<tr>
<td>3/18-21</td>
<td>Mike Swartz</td>
<td>Merida, Mexico</td>
<td>Ormco de Mexico; J. Lira (525) 208-6803; Using New Archwire Technology</td>
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<tr>
<td>3/24-26</td>
<td>David Sarver</td>
<td>Singapore</td>
<td>Singapore Int. Ortho Congress; Dr. Djeng 734-3163; Surgical Orthodontics</td>
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<td>3/31</td>
<td>Craig Andreiko</td>
<td>Hanover, Germany</td>
<td>U. of Hanover; Ormco Dent. GmbH 49-8381-92180; Intro to Orthos</td>
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<td>Craig Andreiko</td>
<td>Frankfurt, Germany</td>
<td>U. of Frankfurt; Ormco Dent. GmbH 49-8381-92180; Intro to Orthos</td>
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<td>Craig Andreiko</td>
<td>Munich, Germany</td>
<td>U. of Munich; Ormco Dent. GmbH 49-8381-92180; Intro to Orthos</td>
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<tr>
<td>4/2-3</td>
<td>Michael Scott</td>
<td>Taipei, Taiwan</td>
<td>Yong Chi; J. Yu (886-2) 778-8315; 21st Century Ortho Mechanics*</td>
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<td>4/2-3</td>
<td>Michael Marcotte</td>
<td>Paris, France</td>
<td>AOSM; Josiane (1) 48591617; Diag. &amp; Surg. &amp; Non-Surg. Tx. of Asymmetries</td>
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<td>4/4-5</td>
<td>Michael Scott</td>
<td>Changhwa, Taiwan</td>
<td>Yong Chi; J. Yu (886-2) 778-8315; 21st Century Ortho Mechanics*</td>
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<td>4/7-8</td>
<td>Wick Alexander</td>
<td>St. Louis, MO</td>
<td>Ormco; Ms. Van Deroef (800) 854-1741, Ext. 714; Alex. Disc. Comprehensive*</td>
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<tr>
<td>4/8</td>
<td>Mike Swartz</td>
<td>Boston, MA</td>
<td>Tufts Cont. Ed.; Ms. Paquette (617) 636-6629; New Archwire Technology</td>
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<tr>
<td>4/8-9</td>
<td>Michael Scott</td>
<td>Singapore</td>
<td>Budget Dental; Mr. Lim (65) 339-6288; 21st Century Ortho Mechanics*</td>
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<td>4/10-12</td>
<td>Michael Scott</td>
<td>Bangkok, Thailand</td>
<td>Accord Corp.; Ms. Suchada (66-2) 214-5290; 21st Century Ortho Mechanics*</td>
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<td>Manila, Philippines</td>
<td>A.V.M.; Ms. Mandap (632) 843-6208; 21st Century Ortho Mechanics*</td>
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<td>4/17-22</td>
<td>R. Bennett, Jr.</td>
<td>Dana Point, CA</td>
<td>Drs. Bennett &amp; Hilgers; Linda (714) 830-4101; Bioprog. Tx. &amp; Practical Ortho*</td>
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<td>R. Baker, Jr.</td>
<td>Rochester, NY</td>
<td>Eastman Dental Center; Sarah Williams (716) 275-1143; Lingual Orthodontic Conf.</td>
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<td>Wick Alexander</td>
<td>Lisbon, Portugal</td>
<td>AOSM; Josiane (1) 48591617; Alexander Discipline Comprehensive*</td>
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<td>4/27-28</td>
<td>David Sarver</td>
<td>White Plains, NY</td>
<td>New Conn. Study Gp.; Dr. Sanders (914) 946-5860; LeFort 1 Osteo. Response</td>
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<td>PT. Ormco; Ms. Sirger (62-21) 751-0484; Lingual Orthodontics*</td>
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<td>Forte del Marmi, Italy</td>
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<td>Drs. Bennett &amp; Hilgers; Linda (714) 830-4101; Practical Ortho.* Intl (Doctors)</td>
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<td>Mario Paz</td>
<td>Beverly Hills, CA</td>
<td>Ormco &amp; Spec. Appl.; Shelly (310) 278-1681; Lingual Orthodontics*</td>
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<td>Wick Alexander</td>
<td>San Francisco, CA</td>
<td>AAO Annual Mtg.; 9-5 Lecture – Contemporary Edg. Ortho; The Alex. Approach*</td>
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<td>Anoop Sondhi</td>
<td>San Francisco, CA</td>
<td>AAO Annual Mtg.; Lecture – Imaging of the Temporomandibular Joint</td>
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<td>AAO Annual Mtg.; Diag. &amp; Tx. Planning in 3 Dimension, Hands-On Workshop</td>
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<td>Quebec Dental Meeting; Lecture – Alexander Discipline</td>
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<td>AOSM; Josiane (1) 48591617; Lecture – “Orthodontics and Esthetics”</td>
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<td>Michael Marcotte</td>
<td>Peabody, MA</td>
<td>New Eng. O. Study Club; Dr Wojcick (603) 889-2164; Diag. &amp; Tx Plan. of Asym.</td>
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<td>Mike Swartz</td>
<td>Boulder, CO</td>
<td>Denver Sum. Mtg.; Dr. Youngquist (719) 593-7942; New Archwire Technology</td>
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For sponsors’ addresses or other course information, call Ormco - Marilyn Van Deroef (800) 854-1741, Ext. 714 or (818) 852-0921. International doctors, please contact your Ormco distributor.