The widespread use of the preadjusted orthodontic appliance has assisted orthodontists in achieving good final results for patients in general. However, the orthodontist is limited in achieving excellent final results because of individual patient variation from the prescription of the preadjusted appliance as well as the orthodontist's ability to precisely place the appliance. This article presents a comprehensive system of evaluation of the individual patient to be used during the finishing stage of treatment and a written system of notation that can guide the orthodontist in producing an excellent finished result for each patient. In this system the orthodontist considers multiple aspects of esthetics, occlusion and function, periodontal health and root alignment, and stability. Every feature of these characteristics is examined and desired changes are noted on the “Detailing Form” resulting in a written plan that guides the orthodontist to achieve excellence in finishing. This written form can also act as a final checklist of obtainment of the goals of orthodontic treatment. This system of finishing can improve the efficiency of the individual orthodontist and assist in communication in multidisciplinary practices. (Am J Orthod Dentofacial Orthop 1999;115:476-87)

**THE DETAILING FORM**

The foundation of this system of finishing is the “Detailing Form” (Fig 1). This form is divided into six sections: three sections for recording examination findings and three sections for wire adjustment notations and procedures that need to be completed.

**THE FINAL DETAILING APPOINTMENT**

The Detailing Form is used during the “Final Detailing” appointment, the first step in the finishing process. At the Final Detailing appointment the orthodontist thoroughly examines the patient and records findings on the Detailing Form. These notations establish a comprehensive basis from which a written integrated plan of changes can be made. These examination notations are also a valuable record of the status of the patient at this time in treatment. The second part of the Final Detailing appointment involves adjusting and inserting the final finishing wires.

About 4 to 7 months before the anticipated removal of the appliances, the patient is scheduled for the 45 minute Final Detailing appointment. The patient should have a Class I occlusion with all teeth aligned and spaces closed.

**MARKING OF THE DETAIL WIRES**

The assistant checks that the patient’s wires are centered and then marks the wires (Fig 2) with a black marker in the maxillary arch and a red marker in the mandibular arch. A wide midline mark, smaller interproximal marks, and a solid mark on the right end of the wire (to distinguish right from left should the wire
Fig 1. The Detailing Form.
be flipped) are made. If there are any torque changes to be made in the wire, it is best to use a 0.019 × 0.025 titanium molybdenum alloy (TMA) (Ormco Corporation, Orange, Calif) finishing wire in a 0.022 slot. A 0.017 × 0.025 TMA wire can be used in a 0.018 slot. This wire is still flexible and will engage the slot adequately to deliver the desired movement. However, this wire is brittle and can break easily if one places too many bends. In addition, this wire tends to collapse with strong closing mechanics and may not hold arch form as well as a stainless steel wire. A 0.019 × 0.025 stainless steel wire in a 0.022 slot is usually too heavy to make very many adjustments and still be able to fully engage it into the slot without debonding the bracket or causing excessive pain to the patient.

**EXAMINATION OF THE PANORAMIC RADIOGRAPH FOR ROOT ANGLE BENDS**

A panoramic radiograph is obtained. While the assistant is preparing the wires, the orthodontist examines the panorex (Fig 3A) for root parallelism and notes on the Detailing Form (Fig 3B) where, how, and to what degree to make root angle bends. The notation is drawn on the form in the same manner that the bend will be made in the wire. A “V” bend in the maxillary wire would bring excessively divergent roots together. For example, when the maxillary central incisors’ roots are too divergent, the proximal contact is located too incisally and an unesthetic triangular black space is created. The orthodontist should make notations on the Detailing Form to make a “V” bend in the wire to upright the central incisors’ roots bringing them together moving the proximal contact gingivally creating a normal gingival embrasure. If adjacent roots are too close together, a “tent” bend is made to move them apart. Another common problem area is in root angulation of maxillary second premolars and maxillary first molars. For example, when evaluating the marginal ridges of the maxillary second premolar and the maxillary first molar one may notice that the distal marginal ridge of the second premolar is much more gingival than the mesial
marginal ridge of the first molar. When evaluating the panorex, it is noted that there is too much mesial root angulation of the maxillary second premolar. This could have resulted from difficult bracket positioning on a partially erupted maxillary second premolar so that the bracket might not be angulated far enough gingivally on the distal. The bracket on the maxillary first molar might be in an ideal position. This root and occlusal table relationship would result in a marginal ridge discrepancy that could be corrected by a root angle bend of the second premolar moving the root distally.

The orthodontist needs to keep in mind the root positions as seen on the panorex as the foundation of the occlusion and determine interrelationships when examining the patient’s occlusion for esthetics, function, health, and stability.

EXAMINATION OF THE PATIENT’S FACIAL FORM, INCISOR DISPLAY, AND GINGIVAL CONTOURS

For efficiency of movement the following sequence in the examination of the patient is suggested. For example, after evaluating the patient’s overall facial symmetry, the orthodontist should evaluate incisor display and then check the patient’s midlines. Overall, the order of observation is from general facial and dental esthetics, narrowing the focus to specific tooth positions.

The orthodontist begins the examination of the patient with the patient upright at eye level. First, the orthodontist evaluates overall facial symmetry, lip and occlusal plane horizontal symmetry, and determines if any changes need to be made by tooth movement. Notation of symmetry is made in the first section of the Detailing Form. Next, the orthodontist evaluates incisor display at rest and smiling and notes measurements in the first section of the Detailing Form. The orthodontist determines if any periodontal procedures should be considered to improve incisor display, gingival esthetics, or stability. Gingivectomies may be required to establish ideal scalloping. Frenectomies may be needed to maintain diastema closure. Notations for needed procedures may be made on the lower portion of the Detailing Form.

EVALUATION OF COINCIDENCE OF FACIAL MIDLINES WITH DENTAL MIDLINES AND OCCLUSAL PLANE

Next the orthodontist checks the coincidence of the dental midlines with the facial midline and makes notations in the third section of the Detailing Form. Any cant to the occlusal plane or slant to the dentition should be noted and wire changes through root angle bends that would correct such a cant (Fig 4A) should be written in the wire changes section of the Detailing Form (Fig 4B).
EVALUATION OF FUNCTIONAL HABITS

The orthodontist should note in the first section of the Detailing Form the functional concerns of tongue thrusting, lip biting, digit sucking, mouth or nose breathing, nail biting, bruxism, clenching, or playing musical instruments with the mouth. This evaluation allows one to identify specific concerns regarding stability and to suggest the need for additional methods of retention to improve stability. Notations regarding the best form of retention can be made in the final section of the Detailing Form.

EVALUATION OF THE TEMPOROMANDIBULAR JOINTS AND FUNCTION

With the patient sitting upright, the orthodontist should screen the temporomandibular joints (TMJ) for signs or symptoms, as well as asking the patient if there have been any sounds or pain. The orthodontist should evaluate interincisal opening, sounds, range of motion, and deviation of the path of opening. Then the orthodontist should check if centric relation is coincident with centric occlusion and note in the TMJ portion of the Detailing Form any initial points of contact, slides, or shifts. The orthodontist should evaluate and note on the Detailing Form tooth guidance in excursions and balancing interferences (Fig 5). Notations can be made in the wire changes section of the Detailing Form for adjustments that would improve function.

The orthodontist should determine if all the objectives for function have been achieved and if not, note changes to be made in the wires in that section of the Detailing Form to bring about the desired function.

EVALUATE ANGLE CLASSIFICATION AND OVERJET

The orthodontist should evaluate the Angle classification of occlusion and if it is not Class I, then it should be noted in the third section of the Detailing Form how many millimeters Class II (Fig 6) or Class III it is. Overjet should also be noted.

The orthodontist should note the need for elastic wear, for interproximal reduction for tooth size concerns, or for restorative needs as with small maxillary laterals in the fifth section of the Detailing Form.

EVALUATE POSTERIOR TRANSVERSE CONCERNS

The orthodontist should evaluate posterior transverse relationships, posterior crossbite tendencies, or buccal position of individual teeth, especially maxillary second molars. Notations of findings should be made in the third section of the Detailing Form.
EVALUATE VERTICAL RELATIONSHIPS

The orthodontist should evaluate vertical relationships such as curve of Spee and overbite in millimeters and percentages. Notations should be made in the third section on the Detailing Form.

EVALUATE SPACING AND TOOTH SIZE RELATIONSHIPS

The orthodontist should evaluate spacing and determine the best method to correct any concerns. Notation regarding the need for restorative therapy should be made in the fifth section of the Detailing Form.

EVALUATION OF MAXILLARY ANTERIOR TOOTH POSITIONS

Now that the orthodontist has an overall view of root positions, function, and the occlusion, specific positions of the teeth are evaluated. Starting with the maxillary anteriors the orthodontist should check that the central incisors are even and equilibrate the incisal edges if this has not been accomplished already. If length adjustments are going to be corrected restoratively, then notation should be made in the fifth section of the Detailing Form.

The central incisors are checked that they are balanced in their root angles and that there are no black triangular spaces that can be changed by root angle bends, stripping and space closure, or restoratively. Next, torque of the maxillary incisors should be similar for all incisors for the best stability in alignment. When the lateral incisors have been palatally positioned initially, extra labial root torque may be needed to improve stability and prevent relapse during retention. Torque of the maxillary incisors should be evaluated again later when examining alignment of the incisors intraorally from the incisal view with a mirror. The maxillary lateral incisor edges should be slightly higher than the central incisor edges (Fig 7A) so that the lateral incisors are more likely to clear the mandibular canine tips in protrusive excursion. The maxillary canines should be slightly longer than the maxillary central incisors for the best canine guidance in lateral excursions. Notations to adjust the maxillary wire should be made in that section of the Detailing Form (Fig 7B).

EVALUATION OF MAXILLARY RIGHT POSTERIOR SEGMENT AND THE MAXILLARY LEFT POSTERIOR SEGMENT

Next, the orthodontist should focus on the patient’s maxillary right from the canine posterior to the molars. “Ideal” crown torque of the canine (Fig 7A) should be checked and notations to change it should be made in the wire changes section of the Detailing Form. Then the orthodontist should evaluate crown torque and the parallel contours of the facial surfaces of the premolars and molars (Fig 7A). Notations regarding necessary torque changes should be made in the wire changes section of the Detailing Form.

The facial cusp lengths of all the facial cusps should be even and of the same length except that the maxillary canine should be slightly longer for best canine disclusion (Fig 7A). Next, the flatness of the occlusal table as examined from the occlusal should be checked with spe-
cial attention in the second molar area (Fig 8). The orthodontist should check the alignment of the central fossae and the alignment of the functional lingual cusps. Often the second premolar is smaller faciolingually and a compromise might have to be made in aligning the facial surface of the tooth or in the position of the functional lingual cusp of this second premolar (Fig 9). Notations regarding changes to be made in the finishing wire are made in the wire changes section of the Detailing Form.

The same analysis of torque, parallel contours of the facial surfaces, cusp length, occlusal table, central fossae alignment, and lingual cusps alignment for the maxillary left quadrant is completed, and notations regarding changes to be made in the finishing wire are noted in that section of the Detailing Form.

EVALUATION OF THE MANDIBULAR ANTERIOR SEGMENT

The mandibular anteriors canine to canine (Fig 7A) are evaluated for even height of the four incisors, long axis of the crowns, and normal triangular embrasures, rotations, and ideal torque. Torque of all four incisors should be the same for the best stability especially if there were significant discrepancies in the labiolingual positions of the incisors initially. The mandibular canines are checked making them a little higher than the other more posterior functional buccal cusp tips for the best canine disclusion. The mandibular canine may be rotated out slightly on the mesial for the most stable contact with the mandibular lateral to resist the tendency for lingual collapse and relapse. Appropriate notations are made in the wire changes section of the Detailing Form.

EVALUATION OF THE MANDIBULAR RIGHT AND MANDIBULAR LEFT POSTERIOR SEGMENTS

The orthodontist should then focus from the mandibular canine posterior to the molars on the patient’s mandibular right checking for parallel contours of the facial surfaces, need for torque changes for improvement in buccolingual inclination, alignment of the functional buccal cusps, and cusp tip height (Fig 10A). The alignment of the fossae and the flatness of the occlusal table are also checked especially at the second molars. The flatness of the curve of Spee is evaluated. Needed tooth position changes are noted in the wire changes section of the Detailing Form (Fig 10B).

The focus is shifted to the left posterior segment and alignment of the facial surfaces, crown torque, alignment and height of the functional buccal cusps, central fossae alignment, and the flatness of the occlusal table are evaluated. Needed changes are noted on the Detailing Form.

INTRAORAL EVALUATION OF ALIGNMENT AND INTERDIGITATION OF THE OCCLUSION

The next stage of the finishing process is an intraoral evaluation with the patient in a supine position. The orthodontist evaluates dental alignment and need for correction of rotations especially in the upper premolar area in positioning the maxillary functional lingual cusps to articulate into the distal fossae of the
mandibular premolars. The orthodontist should check torque of the incisors with a mirror looking along the long axis of the tooth comparing torque with the adjacent incisors. Next, the marginal ridge heights of the posterior teeth should be evaluated.

The final evaluation step and the most important is to view the occlusion with a mirror looking up under the buccal cusp tips and incisal edges of the maxillary teeth and checking the meshing of the mandibular buccal cusps and lower incisal edges into the fossae of the maxillary arch (Fig 11). Changes that need to be made to improve interdigitation should be noted in the wire changes section of the Detailing Form.

If there is any question regarding the cusp to fossa relationship or the occlusion in function, horseshoe articulating paper (Bausch Articulating Paper, Pulpdent Corp, Watertown, Mass) (Fig 12) can be used to check occlusal contacts. The orthodontist may prefer to evaluate the patient’s centric relation-centric occlusion coincidence with the patient in the supine position; this could be performed at this time.

BENDING AND INSERTION OF THE “DETAIL” WIRE

When all desired changes have been noted, the orthodontist must decide whether to bend the detailing wire immediately with the patient present or whether to do so during nonpatient time. Bending a detailing wire during nonchair time is simplified by having all of the notes written on the Detailing Form for bends that need to be made in the finishing wires. The bends are very subtle, and the orthodontist should be cognizant of the potential undesirable side effects of each bend. Small subtle bends can be made using an AEZ Arch Bending Plier (AEZ Arch Bending Plier, No. 803-0403, Ormco Corporation, Orange, Calif) that has blades 1.27 mm thick. If a snub-nosed plier with thick blades is used, subtle bends will be difficult to make. Usually each wire should have no more than ten adjustment bends.

It is most efficient to do all the bends at one appointment although the patient is sore for 1 or 2 days. First, the orthodontist should place root angle bends, then vertical and in/out bends starting in the maxillary wire. Finally, torque changes are made. If both wires are being inserted at the Final Detailing appointment, the finishing bends are made first in the maxillary wire, then the wire should be adjusted for flatness and coordinated with the mandibular wire. Next, the mandibular wire is bent using the same sequence, adjusting flatness, and coordinating it with the completed maxillary wire. Using this sequence preserves the initial arch form of both wires.

Both wires are inserted and tied in with wire ligatures using a snub nose plier to fully insert the wire into the bracket slot and a wire director (Wire and Ligature Director No. 05, Dentronix Corporation) to completely hold the wire ligature against the detail wire in the slot. Full slot seating is desired. Closing mechanics may be used if there is concern about space reopening.

FOLLOW-UP DEBAND CHECK APPOINTMENT

When the patient returns in 4 to 6 weeks for a Deband Check appointment, the assistant will untie the wire completely, mark interproximals of each wire and remove the wires. The orthodontist again will check the occlusion, and the assistant will note desired changes on the Detailing Form using another ink color and noting the date with that same ink color (Fig 13). The orthodontist makes the desired bends and the wire is inserted and completely tied in. When no more changes are needed, appliance removal is scheduled.

PROCEDURES AFTER REMOVAL OF THE APPLIANCES

When the appliances are removed (Fig 14), the orthodontist should check centric contacts with articulating paper, equilibrate the occlusal contacts for even...
distribution, remove any balancing interferences, adjust incisal edges for best esthetics and function, and make a final check of all functional excursions. In selecting the method of retention, the orthodontist should decide if “tooth bleaching” is desirable and incorporate this in the retention phase of treatment.

**DISCUSSION**

Each orthodontist develops a vision of an ideal result for every patient whenever a treatment plan is developed, an appliance is selected and placed, and a method of retention is planned. In the process of determining what will be an ideal result for the patient, the orthodontist must consider factors in four major areas: (1) esthetics, (2) occlusion and function, (3) periodontal health and root alignment, and (4) stability. These four areas are interrelated and often conflicting. Usually, the orthodontist has to prioritize the importance of one desired result over a conflicting consequence of treatment. For instance, an orthodontist may choose to “expand” a patient’s arch form to correct an arch length deficiency, a dentoalveolar retrusion, and enhance esthetics, but then plan long-term fixed retention methods to allow for the compromise in stability that results from expansion of arch form.

**Esthetics**

First, in the area of esthetics, the orthodontist must make decisions regarding facial form and harmony, smile line characteristics, gingival display, incisor display, arch form, dental alignment and inclination, and individual tooth characteristics. The major decisions regarding esthetics are made when the treatment plan is developed. Mack in a review of facial esthetics and treatment planning noted that a comprehensive evaluation that relates the facial soft tissues to underlying skeletal form is necessary in planning correction of deficient facial proportion and integumental form. Margolis suggests a systematic method of analyzing the face and dentition in developing an orthodontic treatment plan for adults.

In his classic article on denture esthetics, Lombardi discusses several factors that also apply to esthetics of the natural dentition that the orthodontist should consider. In the evaluation of the patient, the practitioner should make an analysis of the shape of the mouth, especially the features of width and height and location of the commissures when the mouth is in a smiling position. The orthodontist must consider these characteristics when finalizing arch form. If the ortho-

**Fig 13.** Use of another ink color at the Deband Check appointment.

**Fig 14.** Final occlusion.
dentist selects a very broad square arch form, the first premolar may be a key tooth in a natural transition from anterior to posterior. A natural gradual transition from front to back is critical for the best esthetics, and care should be taken to maintain a natural gradation of facial contour, height, and length. If the maxillary first premolar has excessive labial crown torque, is too short gingivally, or too inset, the overall composition will be disrupted and will be unesthetic. In addition, if arch form is too tapering, the maxillary central incisors will be excessively dominant and could appear too prominent, even protrusive.

Lombardi emphasizes the concepts of formal and informal balance considering the visual weights over a centrally located fulcrum. “Formal balance” requires symmetry of the visual weights on both sides of the fulcrum, whereas “informal balance” exists when the visual weights are equal but not symmetric. When considering the dental midline, Lombardi emphasized that the dental midline should be placed in a stable position, and the visual weights on either side should be in a state of equilibrium. Uneven lengths of the maxillary anterior teeth can detract from this balance and esthetic harmony of the composition. There are also several “lines” to be considered in the esthetics of the dentition: the lines produced by the occlusal plane in relation to the lips and smile line, the lines due to the shapes of the teeth, the lines from the relationships of adjacent teeth with regard to torque and angulation, the lines produced by lengths of the teeth and gingival height, and lines produced by rotations of the teeth. Parallel lines exhibit the most harmony. Lombardi further discusses the impact of “negative” space in the composition of the “positive” space. One should evaluate the smile focusing on the negative space created at the commissures of the lips as well as that between the arches. Also, treatment of the interarch negative space can impart age, sex, and personality characteristics. For instance, straight, flat, incisal edges with sharp corners can give the illusion of an older worn dentition.

Finally, the color and illumination of the dentition should be evaluated. Color enhancement through bleaching or restorative procedures should be part of the finishing treatment plan. Use of the finishing system presented in this article will assist the orthodontist in focusing on the esthetic factors and design changes to achieve an excellent harmonious result.

**Occlusion and Function**

The second major area the orthodontist must consider in finishing is the final occlusion of the patient and acceptability of function. As with overall esthetics, much of the general characteristics of the final occlusion will be determined by the treatment plan. However, the orthodontist must decide what specific characteristics the occlusion will have in three areas: (1) temporomandibular joints, centric relation, and centric occlusion, (2) final occlusal pattern of maximum intercuspatation or achievement of the six keys of a normal occlusion, and (3) functional pattern of canine disclusion or group function.

In the first occlusion area, current literature reveals very limited interaction of morphologic and functional occlusal factors with temporomandibular dysfunction. Nevertheless, a harmonious relationship between the occlusion and the temporomandibular joints should exist. The orthodontist must evaluate if centric relation is coincident with centric occlusion, if it is desirable to have these positions be coincident, if it is possible to achieve coincidence, and what occlusal changes could be made to bring about coincidence.

The second occlusion area to be evaluated and planned is the final occlusal pattern achieved in centric occlusion. The orthodontist must decide if maximum intercuspation with incisor contact is desirable and achievable. Alternatively, the orthodontist may prefer to follow the principles of the “six keys to a normal occlusion” as presented by Andrews. In achievement of this final occlusal pattern, the orthodontist would focus on the interdigititation of the maxillary first molar distobuccal cusp into the mandibular second molar mesial marginal ridge. The clinician may prefer a “lingualized” occlusion. In determining ideal intercuspation, the orthodontist must consider every aspect of position of the functional cusps and fossae, including axial inclinations, marginal ridges, and previous occlusal wear. Use of a systematic method of evaluation and planning changes that are part of an integrated approach are facilitated by the use of the finishing system proposed in this article.

The third occlusion area to examine is the functional pattern of occlusion. The orthodontist must decide the most ideal functional pattern for each patient, be it (1) canine disclusion in lateral excursions, (2) “group function” in lateral excursions and the extent of the teeth involved in group function, and (3) positions of the incisors for anterior guidance. During finishing, the orthodontist should examine the functional pattern of the patient, make notations in the TMJ section of the Detailing Form (Fig 5), and then note wire changes to be made to adjust the positions of the teeth to bring about the ideal functional pattern for that patient.

**Periodontal Health and Root Alignment**

A third major area for the orthodontist to consider in the finishing stage of treatment is in periodontal health and root alignment. The orthodontist should evaluate root proximities, interproximal alveolar bone...
crest and cementoenamel junction alignment, vertical bone defects, open triangular gingival embrasures or “black triangles,” gingival recession, gingival contours and ideal scalloping, pseudopocketing and gingival display, and fibrous frenula. In developing the original treatment plan, initial placement of the orthodontic appliance, and in monitoring progress in treatment, the orthodontist must constantly be aware of root positions of the teeth and condition of the periodontal tissues. In all adults, a thorough examination of the periodontium including probing should be completed before developing the treatment plan and at the end of treatment. The panoramic radiograph should be used when the orthodontic appliance is placed as a guide for the best alignment of the roots. Although incisor root position has not been shown to have long-term deleterious effects on periodontal health, more ideal esthetics, function, and stability are enhanced through good root alignment. Additional periodontal procedures such as frenectomies, gingivectomies, and circumferential fiberotomies should be considered to improve esthetics and stability.

Stability

The final major area for consideration by the orthodontist in finishing the patient’s orthodontic treatment is in the stability of the result. Several factors contribute to this stability, some are determined by the treatment plan, and some are a result of finishing and retention methods.

Stability is affected by the decisions made during treatment planning, such as extraction of teeth, alteration of arch form, expansion of intercanine width, and treatment mechanics. Often the orthodontist may be faced with a compromise in stability for improvement in an esthetic area. For example, the orthodontist may choose to expand arch form and intercanine width to enhance esthetics yet make the result less stable. When the orthodontist has chosen such a compromise, he may select a fixed “permanent” retainer to improve retention. During finishing, the orthodontist may “overcorrect” some teeth that were severely rotated initially. The orthodontist may select a “splint” retainer in a patient who has a bruxism habit. The Detailing Form facilitates the evaluation of factors that may influence stability and impact the selection of the best method of retention for each patient.

Improved Efficiency

In addition to the comprehensive integrated approach that this method of finishing allows, there are also other procedures that are facilitated improving efficiency. If there is need to bend a new finishing wire, such as when second molars are banded, there is a record on the Detailing Form of the necessary bends to be made. If needed, a new wire can be marked with the patient present, bent during nonchair time and inserted at the next appointment.

In multidisciplinary practices, the Detailing Form can be a communication tool among the orthodontists regarding what finishing bends have been made in the wire. At the first Final Detailing appointment, the first orthodontist can examine the patient and make the notations for the finishing procedures that need to be done. At the next appointment, the second orthodontist can easily read the results of the detailing examination, determine what changes in the patient’s occlusion have occurred, and additional adjustments to continue the finishing process so the next orthodontist will easily understand the changes and progress that has been made.

An orthodontist can do a miniature clinical research project if he or she wants to be aware of recurring problem areas in the placement of brackets or the weaknesses in the preadjusted appliance being used. By collecting several Detailing Forms of past patients and analyzing them for notations that are common to all the patients, one can determine repeating patterns and adjust bonding methods or appliance design.

Some orthodontists feel more comfortable repositioning brackets to achieve a better result. Occasionally, a bracket may have been placed so early that good bracket placement was not possible, such as with partially erupted maxillary second premolars. In such a case, it is best to reposition a bracket. However, some orthodontists routinely use multiple bracket repositioning to achieve better finishing with a straight wire. Often this is done because the orthodontist is concerned about making multiple bends in a wire that will not only move the tooth in question, but also have undesirable effects on the adjacent teeth. A major problem of repositioning brackets is that one still creates undesirable side effects and there is no exact record of how the bracket was repositioned. In addition, if a tooth needs a very minor adjustment, one is less likely to reposition the bracket and may just accept the minor rotation. Sometimes a bracket may be repositioned, and it is still not in the desired position. Also, repositioning the bracket causes a weakening of the bond besides etching the tooth an additional time. Finally, repositioning a bond on one tooth here and another tooth there, does not allow one to “see” the whole picture evaluating facial and smile esthetics as well as function and TMJ health.

CONCLUSION

The system of finishing proposed in this article forces the orthodontist to consciously examine, ana-
lyze, decide, and implement adjustments in the four major areas of esthetics, occlusion, periodontal health and root alignment, and stability to bring about that vision of the ideal result. This method of finishing also improves the efficiency of the orthodontist in achieving excellence.

REFERENCES

A METHOD OF FINISHING THE OCCLUSION

Summary
Dr. Rebecca Poling

1. A Method of Finishing the Occlusion – a system of
   a. Observation
   b. Notation
   c. Implementation of final detailing wire bends

2. Examination of the Patient
   a. Facial form
   b. Smile characteristics
   c. Gingival esthetics and health
   d. TMJ health
   e. Function
   f. Interdigitation of the occlusion

3. The “Detailing Appointment”
   a. 4 to 7 months prior to anticipated debanding
   b. Basic Class I occlusion
   c. All teeth aligned
   d. Spaces closed
   e. Appointment is 45 minutes to one hour in length, 15-20 minutes doctor time

4. Steps in the Detailing Appointment
   a. Take panoramic radiograph
   b. Examine panoramic radiograph for root angle bends
   c. Mark detailing wires (17x25 TMA in .018 slot or 19x25 TMA in .022 slot)
   d. Examine facial form, smile characteristics, incisor display, gingival contours, gingival embrasures
   e. Evaluate occlusal plane cant or cant of incisors
   f. Evaluate coincidence of facial midlines with dental midlines
   g. Examine profile and anterior incisor torque
   h. Evaluate functional habits for retention concerns
   i. Evaluate TMJ and occlusal function
   j. Evaluate Angle classification by millimeters and overjet
   k. Evaluate posterior transverse relationships, buccal overjet, and crossbites
   l. Evaluate vertical relationships, overbite, and posterior openbites
   m. Evaluate spacing and tooth size relationships, anterior and posterior Bolton relationships
   n. Evaluate maxillary sextants tooth positions in all dimensions
   o. Evaluate mandibular sextants tooth positions in all dimensions
   p. Intraoral evaluation of interdigitation
   q. Bending the detail wires
   r. Insertion of the detailed wires
   s. Deband check appointment
   t. Procedures after removal of the braces

5. Advantages of System
   a. Detailing form is a record of the occlusal relationships, function, and TMJ signs and symptoms
   b. Detailing form is a continuing record of bends made to the wires
   c. A new wire could be bent with accuracy
   d. A detailing wire can be made during non-chair time
   e. Facilitates better communication in multi-doctor practices
   f. Analysis of Detailing Forms of different patients can reveal repeating problem areas in placement of brackets or in the design of the straight wire appliance being used
   g. The Detailing Form facilitates a comprehensive and integrated approach to achieving excellence in finishing.
6. Examine Panoramic Radiograph
   a. Note on Detailing form location, direction and degree of bend for movement of roots
   b. Notation on form is same direction as bend will be made in wire
   c. Mentally relate root angulation to incisor esthetics, triangular black spaces, incisal edge length, and occlusal plane cant
   d. Relate root angulation to cuspid position, function, interdigititation and marginal ridges

7. Marking of Detail Wires
   a. Check that wires are centered and long enough
   b. TMA (19x25 in .022 slot, 17x25 in .018 slot) or stainless steel edgewise wires
   c. Black marker in maxillary arch
   d. Red marker in mandibular arch
   e. Wide midline mark
   f. Interproximal marks centered between the teeth
   g. Solid mark on right end to distinguish right from left

8. Examination of Facial Form
   a. For efficiency of movement follow outlined sequence
   b. General sequence of observation from general facial and dental esthetics narrowing focus down to specific tooth positions
   c. Examine patient sitting upright at eye level
   d. Evaluate overall facial symmetry
   e. Evaluate lip and occlusal plane horizontal symmetry

9. Evaluation of Incisal Display and Gingival Contours
   a. Evaluate incisor display in millimeters at rest
   b. Evaluate incisor display smiling in percentage or display of millimeters of gingival display
   c. Determine if gingival display or gingival contours should be improved by gingivectomy or gingivoplasty procedures
   d. Determine if necessary frenectomies have been completed as originally treatment planned
   e. Evaluate gingival embrasures in the anterior sextants and the need for interproximal reduction with space closure or restorative changes
   f. Evaluate tooth characteristics of anterior sextants and need for restorative procedures after orthodontic treatment, bleaching, and need for coordination of retention procedures, make notes on Detailing Form

10. Evaluation of Coincidence of Facial Midline with Dental Midlines and Cant of Incisors
    a. Evaluate coincidence of facial midline with dental midline
    b. Note cant to occlusal plane
    c. Note “slant” to the incisors that is correctable with angle bends, correlate with findings on pano
    d. Mark necessary angle bends on Detailing form
    e. Be aware of undesirable side effects

11. Evaluation of the Profile and Anterior Torque
    a. Check profile for any additional changes that can still be made
    b. Assess potential growth
    c. Have patient smile and check anterior torque
    d. Note needed wire adjustments on the Detailing form

12. Evaluation of Functional habits
    a. Check for tongue thrusting, lip biting, digit sucking, mouth breathing, nail biting, clenching, bruxism, playing musical instruments with the mouth that might require additional retention
    b. Evaluate for concerns regarding stability
    c. Note at bottom of Detailing Form all necessary retention methods

13. Evaluation of Temporomandibular Joints and Occlusal Function
    a. With patient sitting upright, screen for abnormal signs or symptoms
    b. Evaluate interincisal opening, range of motion, deviation with opening, sounds, or pain
c. Check if CR=CO noting any IPCs, slides or shifts
d. Check functional excursions noting functional contacts and interferences
e. Evaluate achievement of functional objectives

14. Evaluation of Angle Classification and Overjet
   a. If not Class I note how many millimeters it is Class II or Class III
   b. May be a cuspid root angulation problem
   c. May be a true Class II or Class III
   d. May be a Bolton tooth-size problem
   e. May be a spacing problem

15. Evaluate Posterior Transverse Concerns
   a. Note posterior crossbites or tendencies
   b. Note excessive buccal overjet
   c. Note excessive palatal root torque in maxillary molars

16. Evaluate Vertical Relationships
   a. Note curve of Spee
   b. Note overbite in millimeters and percentage
   c. Note on Detailing Form vertical bends in wires needed to improve gingival display as well as improve function
   d. Note posterior openbites such as open second molars and plan corrective measures

17. Evaluate Spacing and Tooth Size Relationships
   a. Note spacing in the maxillary and mandibular arches
   b. If problem is a tooth size discrepancy discuss options to correct it such as restorative, interproximal reduction, treating to a slight Class II, or leaving space

18. Evaluate Maxillary Anterior Tooth Positions
   a. Check that central incisors are even and equilibrate edges if necessary
   b. Check that central incisors are balanced in their root angles with no black triangular embrasure spaces that can be changed by adjusting root angles, stripping and space closure, or restoratively
   c. Check torque, especially with respect to the laterals for stability in alignment
   d. Check that the lateral incisor edges are slightly higher than the central incisor edges for best protrusive function
   e. Check that maxillary cuspids are the same length as the maxillary central incisors for the best cuspid rise

19. Evaluate Maxillary Right Posterior Quadrant
   a. Check crown torque of the cuspid
   b. Check crown torque and parallelism of facial surfaces of bicuspids and molars
   c. Check facial cusp length with the cuspid longer than bicuspids and molars for best cuspid rise
   d. Evaluate the flatness of the occlusal table especially in the second molar area
   e. Check alignment of central fossae for ideal interdigitation of mandibular functional buccal cusps
   f. Check alignment of the functional lingual cusps, especially when there is a small second bicuspid

20. Evaluate Maxillary Left Posterior Quadrant
   a. Check facial surfaces
   b. Check torque
   c. Check length
   d. Check occlusal table
   e. Check central fossae
   f. Check lingual cusp tip alignment

21. Evaluation of Mandibular Anterior Sextant
   a. Check for rotations
   b. Check for even height of incisal edges
   c. Check for normal triangular embrasures and correct root angulation
   d. Check for ideal torque for best stability
e. Check that cuspids are slightly higher than incisors for best cuspid rise

22. Evaluation of Mandibular Right Posterior Segment
   a. Check alignment of functional buccal cusp tips
   b. Check parallelism of facial surfaces and need for changes in torque
   c. Check buccal cusp tip height
   d. Check alignment of the fossae
   e. Check flatness of the occlusal table
   f. Check flatness of curve of Spee

23. Evaluation of Mandibular Left Posterior Segment
   a. Check alignment of functional buccal cusp tips
   b. Check torque and parallelism of facial surfaces
   c. Check functional cusp tip height
   d. Check central fossae alignment
   e. Check flatness of curve of Spee

24. Intraoral Evaluation of the Interdigititation of the Occlusion
   a. Patient is supine
   b. Evaluate dental alignment
   c. Check anterior torque
   d. Check marginal ridge heights
   e. Check interdigitation with the patient in occlusion using a mirror
   f. Check with horseshoe articulating paper if necessary

25. Bending the “Detail” Wire
   a. Limit number of bends in wire to maintain control
   b. “Balance” root angle bends to minimize undesirable side effects
   c. Can be bent during non-patient time
   d. Bends are subtle
   e. Be cognizant of the potential undesirable side effects of each bend
   f. Use snubnose plier with thin blades
   g. Complete all bends in one appointment
   h. Use a full size wire if many torque changes are needed
   i. Adjust the maxillary wire for flatness
   j. Coordinate maxillary wire with mandibular wire
   k. Bend mandibular wire
   l. Adjust flatness of mandibular wire and coordinate with maxillary wire

26. Insertion of the Detailed Wires
   a. Completely seat wire with snubnose plier and wire director into bracket slot
   b. Tie in wire with wire ligatures

27. Deband Check Appointment
   a. Untie, mark, and remove wires
   b. Note desired changes on the Detail form using another ink color
   c. Make bends in wire and completely seat and tie in
   d. Centric stops and functional excursions can be checked with horseshoe articulating paper

28. Procedures at Removal of the Braces
   a. Place bonded retainers prior to removal of brackets
   b. Check centric stops and functional excursions with horseshoe articulating paper
   c. Adjust contacts for even distribution
   d. Adjust incisal edges for best esthetics and function
A METHOD OF FINISHING THE OCCLUSION

Recommended Materials:

1. Sharpie fine point permanent marker by Sanford, No. 3001 Black, No. 3002 Red
2. Bausch Articulating Paper manufactured by Pulpdent Corporation, 80 Oakland Street, Watertown, MA 02272, available from Summit Orthodontic Services, item 036-003, 1-800-321-9124
3. AEZ Arch Bending Plier (.050") with 1.27 mm thick blades, No. 803-0403 from Ormco Corporation, 1-800-854-1741
4. Wire and Ligature Director No. 305 by Dentronix, 1-800-523-5944
5. Diamond Stripping Discs No. 6918B (flexible double-sided), #940-220 (hyperflex double-sided) from Brasseler 1-800-841-4522
6. Protective cover for Brasseler stripping discs 1-800-841-4522
7. “Donut” Bur from Patterson called Two Stripper No.863C
8. Shofu greenies and brownies (friction grip in high speed) for polishing after debanding
9. Triad Transheet Visible Light Cure Material no. 89271 by Dentsply 1-800-786-0085
10. Invisitain Retention acrylic sheets for clear retainers by INVISITAIN, LLC. at www.Invisitain.com and 800-801-0654 .040 inch thickness, 5 inch squares, Item # SC-0405000
DETAILING FORM

Name__________________________________________________________

Date____________________Age________Growth______________

Facial: 1 1 Rest 1 1 Smile Even

Profile: ________________________________

Functional: TT, Lipb, TS/FS, MB/NB, NailB, Brux/Clench, Music Inst____________________________

Facial:

1 1 Rest_________ 1 1 Smile__________

Profile:

___________________________________________________________________________________________

Functional:

TT, Lipb, TS/FS, MB/NB, NailB, Brux/Clench, Music Inst____________________________

TMJ:_______mm N-ROM_______

CR=CO ant vert lat

Sounds:______________________________

Pain:______________________________

Objectives:

Canine Rise? Right Y N_________ Left Y N_________ Anterior Disclusion? Y N_________

Incisor Contact in CO? Y N_________

Balancing Interferences? N Y _______ where?

A-P: R6_________ R3_________ L6_________ L3_________ OJ=_________

Transverse: _____________________ Posterior _____________________

Vertical: COS_________ OB=_________ mm/_________% Posterior Open_________

Perimeter: =_________ =_________ Bolton:_______ Anterior_______ Overall

OCCLUSAL CHART

R L

CR 87654321 12345678
87654321 12345678

RL 87654321 12345678
87654321 12345678

LL 87654321 12345678
87654321 12345678

PR 87654321 12345678
87654321 12345678

Close Spaces: ___________ Elastics:_______________ Strip: _________________ Restore:_____________________

Frenectomy/Gingivoplasty:________________________________________________________________

Deband Check Date:_________ Date:_________ Date:_________ Date:_________

Retainers: Bonded MX _____ MD _____ Hawleys MX MD Clear MX MD Splint Financials: ___OK

Estimated Target Date:____________________________

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