

ANTERIOR TOOTH FORM AND FORMATION: A SYSTEMATIC APPROACH

Creating esthetic anterior tooth contours that function properly

By Steve McGowan, CDT

MANY YEARS AGO the author was given thousands of extracted teeth that had been collected by the late Tony Ponti, DDS. Over the years these teeth were studied and photographed for personal benefit. Two years ago a project was started that would create a photographic archive, which allows Ponti's vast collection of teeth to be shared. Part of this project resulted in a recently published article, "Characteristics of Teeth: A Review of Size, Shape, Composition, and Appearance of Maxillary Anterior Teeth."¹ In this piece, 600 maxillary anterior teeth were cleaned, photographed, and measured: 200 each of central incisors, lateral incisors, and canines.

Charts were created (Figure 1) to show the measurements taken from the 600 teeth. A steep histogram, or bell curve, means the measurements were very similar. A flatter histogram means the measurements had a greater variability. The blue line would be the exact mean of the measurements. The shaded area represents one standard deviation

The variability of these 600 teeth was astounding. The unique nature of each tooth and each patient are among the factors that make the dental technician's job challenging and exciting.

from the mean. Photographic representations of all four measurements, which correlate with the graphs in Figure 1, are shown in Figure 2. The tooth in the middle of each photograph (Figure 2) is the exact mean in all dimensions. The tooth to the left and right of the middle tooth represents exactly one standard deviation from the mean. The images in Figure 2 show the tremendous variability of the teeth and the broad range of sizes that otherwise might be considered statistically unremarkable.

The variability of these 600 teeth was astounding. This is something that the author has observed while working as a dental technician for more than 30 years. The unique nature of each tooth and each patient are among the factors that make the dental technician's job challenging and exciting.

Maxillary anterior teeth have functional and esthetic components. These teeth are what people see when we speak and smile. Because of this esthetic value, there are countless theories, courses, and presentations to explain and teach the intricacies of maxillary anterior teeth. When we consider color, texture, rotations, spacing, and many more topics, it is easy to get lost in the details. This article will not focus on the details. Instead, a systematic approach for creating a maxillary anterior framework will be discussed. Just like when building a house, the framework or foundation must be constructed first. After the framework is completed, the details are then added to make each tooth unique. Following these exact steps on every case will save a tremendous amount of time and will also allow for the variability of nature.

These steps are followed whether doing six units or one. The same steps are used for wax-ups or definitive restorations, digital or analog. The key is developing efficiency by following the same protocol time after time. This protocol allows the technician tremendous variability for adding the details after the foundation is complete.

About the author



Steve McGowan, CDT
Owner
Arcus Laboratory
Kenmore, Washington

Disclosure: The author had no disclosures to report.

The Steps

1. When creating multiple anterior teeth, the starting points are always the midline and the labial incisal edge of the central incisors. The midline is determined by facial landmarks. A vertical line can be drawn connecting the glabella, apex of the nose, and the center of the chin. A second interpupillary line (Figure 3) can be drawn perpendicular to the facial midline. The labial incisal edge of the central incisors will be parallel with the interpupillary line.

2. The contact points come next. As the contact areas move from the centrals to the canines, they move cervically, as represented by the red line (Figure 4 and Figure 5).

3. The next step is the most critical: the lingual surface. Because all teeth exist within a masticatory system, it is impossible to shape teeth without addressing how they interact with the antagonist tooth or teeth. The incisal edge of the tooth is more accurately an incisal ridge.² The ridge consists of the labial incisal edge, represented by the red line, and the lingual incisal edge, represented by

the blue line (Figure 6 and Figure 7). These two incisal edges form the boundaries of the incisal ridge. The lingual edge, which is often ignored, is the functional component that is dictated by the mandibular incisors and how a person chews. The labial edge is the esthetic incisal edge that is seen when a person speaks and smiles. The maxillary lingual incisal edge is the most critical part of the ridge with regard to function. The lingual edge cannot be ignored or placed arbitrarily without consideration of the mandibular incisors.

The labial incisal edge is the esthetic edge. The location, or placement, of the labial edge is determined mostly by facial esthetics and phonetics. This edge can be lengthened or moved as long as it does not affect function with the mandibular incisors, speech, and facial esthetics.

The incisal ridge is rarely symmetrical and the two edges are rarely parallel (Figure 6 and Figure 7). In short, the lingual function is addressed prior to the labial contour.

4. The mesial line angle, represented by the black line, is created next (Figure 8). When viewed directly from the facial, the central, lateral, and

canines are divided in segments vertically (Figure 5). The central is divided in thirds. The lateral and canine are divided in half. The mesial line angle of the central will start near the contact point and terminate in the cervical portion of the tooth at the mesial third of the tooth. This line angle should match the mesial line angle of the adjacent central incisor as closely as possible.

The lateral mesial line angle starts at or above the contact point and terminates in the cervical portion at the middle half of the tooth.

The mesial line angle of the canine starts above the contact point and angles toward the middle of the tooth.

5. The distal line angles come next (Figure 9), always moving from the central to the canine. Whenever possible, the distance between these line angles should closely mimic the contralateral tooth. The width of the contralateral teeth is not always the same, but they can be optically matched more easily if the line angles match.

6. The cervical height of contour, represented by the white line (Figure 10 and Figure 11) closely

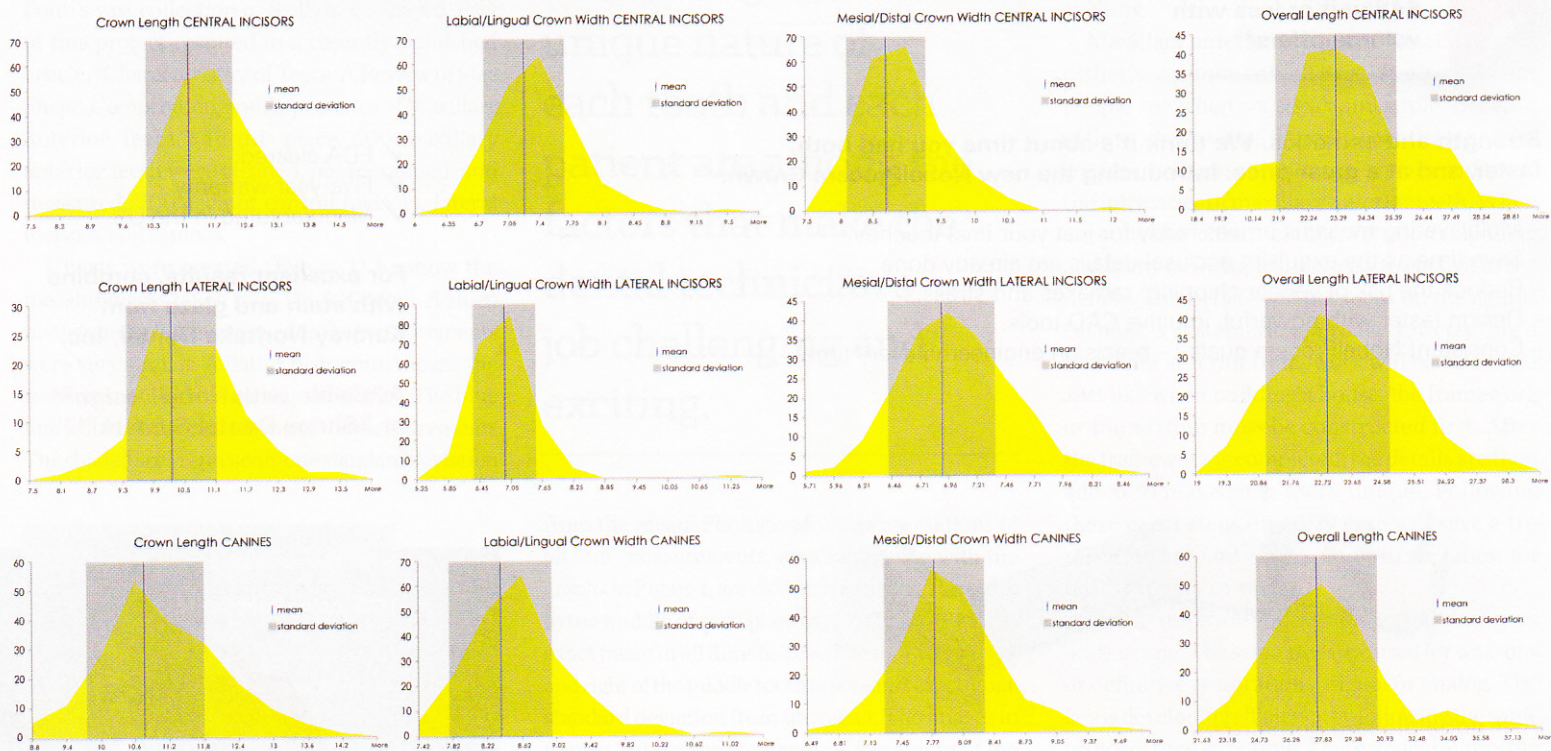
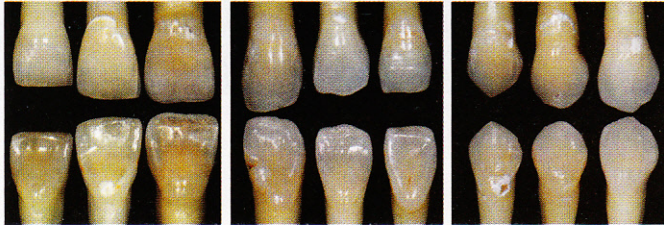


Fig 1. Charts show the measurements taken from 600 teeth.

CENTRALS

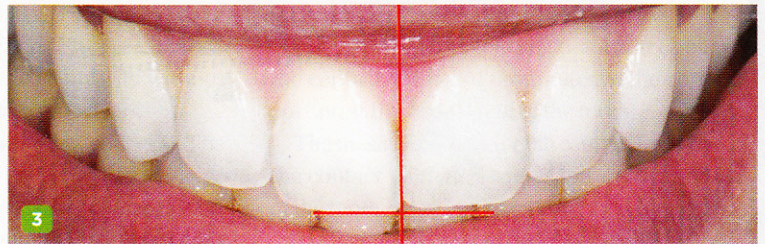
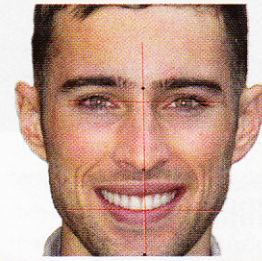
LATERALS

CANINES

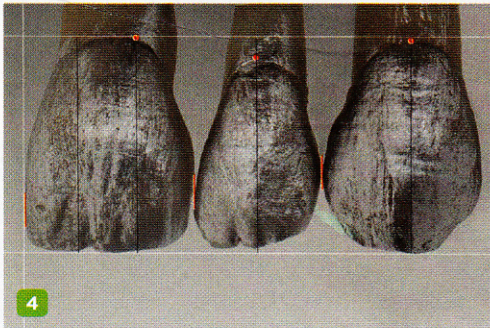


	SD	Mean	SD	SD	Mean	SD	SD	Mean	SD
M/D Crn Width	8.10	8.69	9.28	6.44	6.91	7.38	7.29	7.79	8.29
Crown Length	10.14	11.16	12.18	9.44	10.27	1.10	9.72	10.76	11.80
Overall Length	21.11	23.26	25.41	21.10	22.92	24.74	24.35	27.03	29.71
L/L Crn Width	6.73	7.19	7.65	6.34	6.92	7.50	7.80	8.39	8.98

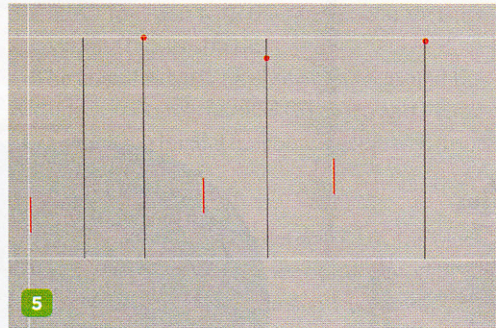
2



3



4



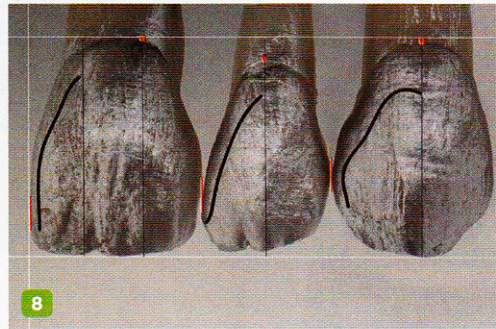
5



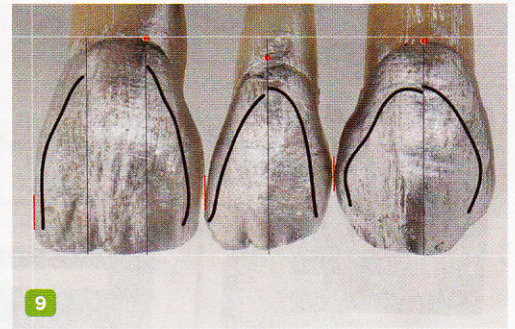
6



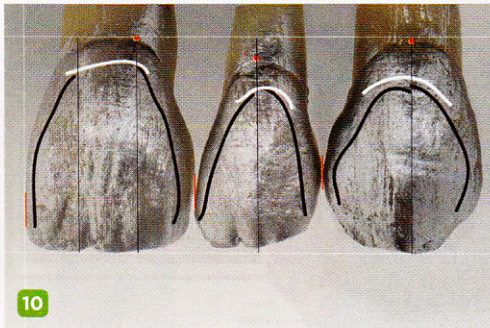
7



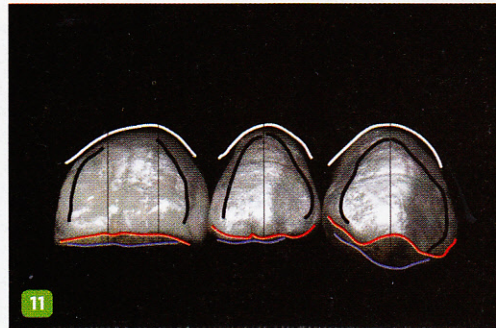
8



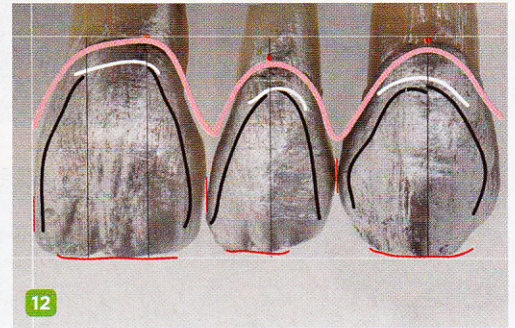
9



10



11



12

Fig 2. Photographic representations of all four measurements, which correlate with the graphs in Figure 1. **Fig 3.** Facial landmarks determine the midline and a second interpupillary line aligns the horizontal plane of the central incisors. **Fig 4 and Fig 5.** As the contact areas move from the centrals to the canines, they move cervically, as represented by the red line. **Fig 6 and Fig 7.** The ridge consists of the labial incisal edge, represented by the red line, and the lingual incisal edge, represented by the blue line. **Fig 8.** The mesial line angle, represented by the black line. **Fig 9.** The distal line angles are always moving from the central to the canine. **Fig 10 and Fig 11.** The cervical height of contour, represented by the white line, closely follows the contour of the soft tissue (pink). **Fig 12.** The shape of the labial edge.

The shape of the labial edge can be highly variable as long as it is not in the pathway of the mandibular incisors during chewing.

follows the contour of the soft tissue (pink). This is why it is important to perform this step with a soft-tissue model, or solid model. The apex of the CEJ on the central incisor is at the distal third. The apex of the lateral and canine are at the middle of the tooth (Figure 8).

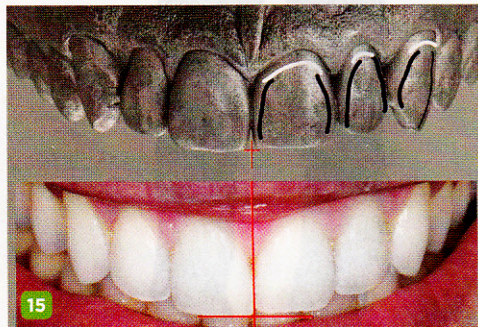
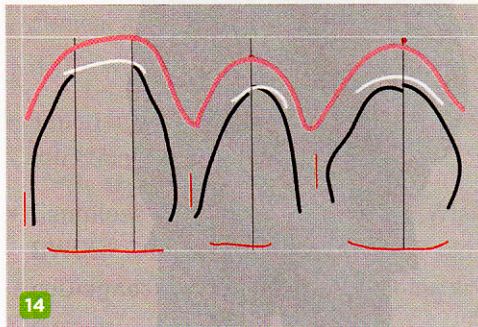


Fig 13. The Kois Waxing Guide is used to show how the central incisors and canines are on the same incisal plane. **Fig 14.** The framework is shown without teeth. **Fig 15.** When the teeth are viewed facially, the distal half of the canine is not in view.

7. The last step for the basic framework is the labial incisal edge. The shape of the labial edge (Figure 12) can be highly variable as long as it is not in the pathway of the mandibular incisors during chewing. Typically, the labial edge of the centrals and the canines will follow the same line when viewed on a horizontal plane. In this case, the Kois Waxing Guide (Panadent, panadent.com) (Figure 13) is used to show how the central incisors and canines are on the same incisal plane.

When the framework is shown without teeth (Figure 14), the basic shapes become apparent. From this point forward, attention can be paid to filling in the lines, or connecting the dots. After the basic framework is completed, the individual esthetics can be completed. The individual esthetics vary from person to person, but the basic framework is always the same and the same steps are always followed.

When the teeth are viewed facially, the distal half of the canine is not in view (Figure 15) or barely in view. The arch form can be broadened simply by making the distal half of the canine more in view.

Conclusion

Creating esthetic anterior tooth contours that function properly requires a tremendous amount of skill and knowledge. Tooth morphology, facial esthetics, soft-tissue contour, and occlusion all play roles. When creating a framework it is important to not get locked in to a specific tooth form or design. The framework should follow the basic commonalities of teeth and allow room for the variability of details. Having a consistent repeatable protocol for the basic framework will save tremendous amounts of time.

References

1. McGowan S. Characteristics of Teeth: A Review of Size, Shape, Composition, and Appearance of Maxillary Anterior Teeth. *Compend Contin Educ Dent.* 2015;37(3):164-172.
2. The glossary of prosthodontic terms. *J Prosthet Dent.* 2005;94(1):10-92.



This article was double-blind peer reviewed by members of IDT's Editorial Advisory Board

Nacera

INNOVATIVE
FLEXIBLE
EFFICIENT

Nacera[®] Blue X
Translucent Liquid

Nacera[®] Blue X Translucent Liquid will increase the translucency on Nacera[®] Zirconia up to 8%.

- ✓ Flexible. Cusp tips, anterior spaces, incisal edges - use where desired
- ✓ Certain. Raise translucency and keep „full strength“ mechanical properties
- ✓ Innovative. Increases translucency selectively and specifically on white or shaded zirconia. (3Y-TZP)



Learn more: www.nacera.us
Call us: +1 215-345-5283