The configuration of the occlusal plane is one example of nature's beautiful and intricate designs. The dynamics of function play out so precisely with the arrangement of teeth. All components of this complex design are functionally interrelated. Any alteration in one aspect of this design can have deleterious effects in another. A further description is voiced by Dr. Peter Dawson who says, “The plane of occlusion refers to an imaginary surface that theoretically touches the incisal edges of the incisors and the tips of the occluding surfaces of the posterior teeth.”

When we relate to a plane we initially think of a flat surface. However, this is not the case with the occlusal plane.

Two areas constitute the occlusal plane and should be addressed separately. These are the anterior teeth, and the posterior teeth.

The position of the anterior teeth are determined by esthetics, the demand for anterior guidance, and phonetic considerations.

Posterior teeth position is defined by two curves. The curve of Spee and the curve of Wilson. “An ideal curve of Spee is aligned so that a continuation of its arc would extend through the condyle. The continuation of this arc relates on average with a 4 inch radius.”

Dawson goes on to describe that if the curve goes through the condyle the occlusal plane will always be flat enough to facilitate posterior disclusion even with a flat anterior guidance.

The anterior/posterior curve is designed so that the posterior teeth can be separated in protrusion, by the affects of condylar guidance and anterior guidance. This phenomenon reduces posterior interferences.

A functionally protective mechanism exists in regards to anterior and posterior teeth. As the functional contacts of the posterior teeth disclude and all contacts shift to the anterior teeth, the strong forces of the elevator muscles are shut down thus reducing forces to the anterior teeth. A proper occlusal curve or plane helps to accomplish this fact. The balance between condylar guidance and anterior guidance is extremely important.

If the occlusal plane does not allow for this decrease in muscular loading then we have a mechanical disadvantage. This discrepancy will lead to excessive wearing of teeth due to hyperactivity of the musculature.

The second curve associated with the occlusal plane is the curve of Wilson. “It is the mediolateral curve that contacts the buccal and lingual cusp tips on each side of the arch.” Because it is always related to the lower arch its importance is sometimes overlooked. This curve allows for the lingual cusps of maxillary teeth to function with the lower occlusal scheme without interference.

One instrument that can aid the dentist and technician in studying and locating the proper curve of Spee is the Broadrick Flag. This

- continued on inside
device is manufactured to fit a number of articulators. However, none exist for the Sam 3® System. The Sam® System is so unique that I decided to develop an instrument to act as an occlusal plane analyzer. This instrument is called the Wynne 2000. It performs all the functions of the Broadrick Flag.

There are a number of factors that make the Sam 3® a special instrument.
1. Split cast accuracy. Can check after each usage for distortion.
3. Modular systems – Components to increase capabilities.
4. Centric locking device.

The occlusal plane analyzer can aid in getting a preliminary determination of the plane on study models. It can tell you the precise location of all posterior cusp tips. In addition, it can show you how much tooth reduction or porcelain addition you need to idealize the patient’s occlusal plane.

This adult female patient presented with a desire to improve the appearance of her smile. (figure 1) Her mandibular incisors were jumbled and discolored. Her maxillary teeth were worn, crowded, and discolored. In addition her occlusal plane was canted, lower on her right side than her left. (figure 2)

Our objectives were to:
1. Straighten her mandibular incisors. (figure 3)
2. Generate a brighter uniform colored dentition.
3. Raise her right occlusal plane to make it equal in appearance to her left plane. (figure 4)
4. Eliminate the worn and crowded arrangement of her maxillary teeth.

A thorough evaluation of her occlusal plane was indicated. (figures 6, 7, 8) Our evaluation revealed that her left plane was approximately 1.5 mm lower than the right. The solution would be to raise her left plane by 1.5 mm, thus creating a more pleasing appearance.

Our laboratory technician utilized the calipers and created or placed the cusp tips 1.5 mm higher than on the original models. (figures 5 and 9) The result was a significant esthetic improvement over her preexisting plane (figure 3).

The option of orthodontic treatment was given to the patient. She declined, so teeth 23&24 were extracted and replaced with bridgework to properly align her arch (figure 3).

After her mandibular restorations were inserted, her Maxillary natural teeth were temporarily equilibrated until the next morning. At that time her maxillary teeth were prepped.

Figure 1

Figure 2

Figure 3

Figure 4

Figure 5

Figure 6
Prep design for her maxillary anterior included enough room for characterization of the porcelain.6

Material selection for this case involved Authentic by Microstar. The only exception was one bridge that was too long for the Authentic technique. The compatible material utilized was Noritake EX3 on Argen Euro alloy (figure 10). A combination of restorations were utilized including conventional porcelain fused to metal, porcelain pressed to metal, full porcelain crowns, and onlay veneers.

These restorations were to be placed not only in the esthetic zone but in the functional zone. Different criteria are utilized for selecting materials in these two zones.

In the functional zone we wanted the superior strength of porcelain fused or pressed to metal. Authentic by Microstar was utilized on the smaller posterior bridge. One bridge was too long to fit in the casting ring, so we opted for a compatible material in strength and optical properties. Noritake EX3 on Argen Euro alloy was our choice. A stacked technique was utilized for this bridge.

In the esthetic zone we wanted to minimize the metal blocking light transmission, so we utilized a minimal framework on the anterior bridges. Onlay veneers, as well as full porcelain crowns completed restoration selection in the esthetic zone.

This protocol for material and restoration selection allowed us to place strong restorations in the functional zone, and tooth-like restorations in the esthetic zone. Through the utilization of the Wynne 2000, and the Sam 3® articulator the dentist and technician were able to create an esthetically correct and functional dependable occlusal plane (figure 11).

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1.2.3.5, Dawson PE, Evaluation Diagnosis and Treatment of Occlusal Problems (2nd ED; Chapter 24). St. Louis, Mo.: Mosby; 1989 pg. 86-87.


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