

**First and foremost,**  
our dental records  
**must** represent  
anatomically correct  
information.

## **Rationale for Use of Semi-Adjustable Articulators in the Dental Practice & Laboratory**

**By Michael Hrankowski, DDS**

Achieving excellence in clinical dentistry is demanding work. The success of the final result is dependent upon the accuracy of many clinical and laboratory steps. An error in any one step often perpetuates further errors and may lead to a less-than-ideal result or to outright clinical failure.

So much of what we do in dentistry is subjective. The question always remains: How accurate does something need to be in order to meet with our acceptance? In other words, how good is good enough? Each dentist and technician must answer this question according to his/her own clinical, technical and ethical standards.

In my journey toward clinical excellence, I have always used a simple guideline to answer that question: I must be as accurate as my technical skills, materials and knowledge compel me to be.

For example: Why don't we use alginate for crown and bridge impressions, or when investing a wax pattern why don't we just "eyeball" the amount of water we use? The answer is obvious — ACCURACY.

Yet, when it comes to the choice of articulators, the prevailing thought seems to be "If it's got a hinge, it's good enough." A detailed look at the principles of dental articulation and occlusion will expose this as a fallacy.

First and foremost, our dental records must represent anatomically correct information. Without exact information we are only guessing. Therefore, for an articulator to be acceptable, it must be anatomically correct and should allow enough adjustment to accommodate a majority of patients.

Capturing the **correct mandibular arc of closure** is probably the **most compelling rationale** for the use of a semi-adjustable articulator.

The following parameters need be considered:

1. Intercondylar distance
2. Condylar inclination
3. Mandibular arc of closure
4. Hinge axis position [Centric Relation (CR) and Centric Occlusion (CO)]

Anatomical studies done by Bonwill have shown that the average intercondylar distance is 110mm (Fig. 1). Most semi-adjustable articulators currently on the market have their condylar distance set at or close to this value. Because of the geometry involved in mandibular movement, this parameter has a relatively small impact on the accuracy of the finished restoration.

Condylar inclination is an important parameter in building a non-interfering posterior occlusion. Although the majority of patients have inclinations steeper than  $20^{\circ}$ , the clinician will encounter many patients whose inclination is less steep. Articulators with semi-adjustable condylar housings can be set quite accurately through the use of a protrusive check bite.

It should also be kept in mind, that as long as the articulator's condylar inclination is set *less* steep than that of the patient, the laboratory technician can then fabricate restorations with the confidence that there will be no unintentional posterior interferences (assuming, of course, adequate anterior guidance).

Capturing the correct mandibular arc of closure is probably the most compelling rationale for the use of a semi-adjustable articulator (Fig. 2). The use of a face bow registration fixes the maxillary cast in the same three-dimensional plane in relation to the condyles as exists in the patient and thereby reproduces the patient's arc of closure (Fig. 3).

It can be demonstrated geometrically that "high spots" on restorations can be caused by improperly formed occlusal morphology interfering with the patient's arc of closure when restorations are fabricated on a non-anatomic hinge (Fig. 4). I made an informal survey to find out what the most frequent complaint was that dentists had with their laboratories. Both dentists and labs confirmed that "high occlusions" topped the list.

In an effort to please their clients (or to avoid complaints), lab technicians will often send crowns and bridges that have been purposefully taken out of occlusion. Dentists rarely complain when a crown or bridge goes in without any adjustment.

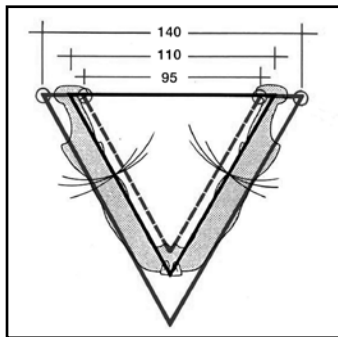


Fig. 1

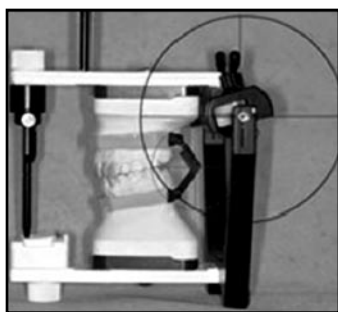


Fig. 2

Sub-occlusal restorations, however, can lead to future problems when teeth supererupt to gain contact. Uncontrolled supereruption may result in improper occlusal contacts on inclined planes and occlusal interferences. Posterior interferences are reputed to be responsible for hyperactive muscle activity, which is seen in bruxism and TMD.

Therefore, making restorations with proper occlusal contact benefits dentist, technician and patient alike.

All semi-adjustable articulators can reproduce CR and CO to acceptable anatomic averages. For the patient without signs or symptoms of occlusal dysfunction, simple restorations may be made to the patient's habitual bite (CO). In this case, once the casts have been groomed, the maxillary cast is mounted with the face bow registration and the mandibular cast is hand articulated against the maxillary cast. It should be noted, however, that the greater the patient's discrepancy between CR & CO, the greater will be the error when treating to this position. The error will still be less than with the use of a simple hinge articulator.

For quadrant dentistry or when there exists signs or symptoms of occlusal dysfunction, treatment to CR is indicated. This requires an accurate CR bite registration, occlusal analysis, splint therapy and/or occlusal equilibration prior to definitive restorative procedures. These advanced procedures can *only* be accomplished on an appropriate semi-adjustable articulator with a face bow transfer.

When it comes to the actual purchase and use of advanced instrumentation, many dentists voice similar objections. A common hesitation is the perceived lack of patient acceptance and/or unwillingness to pay for better care. These obstacles are most often rooted in the belief system of the dentist and not the patient!

When the dentist has a strong belief and can communicate effectively with his/her patients, I have no doubt that most patients will choose the best for themselves and will be willing to pay for it. We have only to offer it to them.

Also, there is the perception among some dentists that semi-adjustable articulators are downright user unfriendly. Face bow registrations have, in fact, been awkward and time-consuming and difficult to teach auxiliaries. And, because of the differences in tolerances between like instruments, the dentist has had to purchase numerous articulators if s/he desired to routinely incorporate their use into practice. Laboratories have had similar complaints.

Therefore, making restorations with **proper occlusal contact** benefits dentist, technician and patient alike.

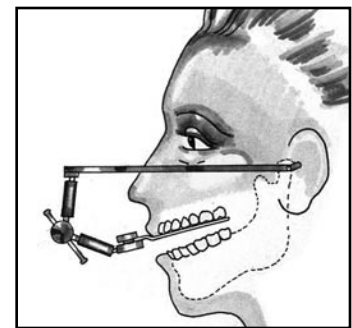


Fig. 3

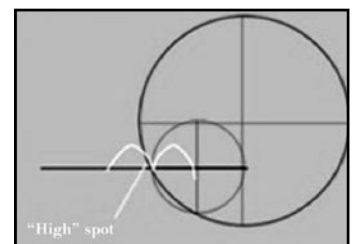


Fig. 4

## About the Author



### **MICHEL HRANKOWSKI,**

a Seattle native, has been in private dental practice since 1982. He earned degrees in both Psychology and Dentistry from the University of Washington, and has served as a dental school faculty member and clinical instructor. He is an alumnus of the Center for Professional Development, the L.D. Pankey Institute, and is an ongoing student and Mentor at the Kois Center for Advanced Dental Education. He has been published in various local and national journals, often lecturing nationally and internationally, and has mentored a dental study group in Berlin, Germany. Dr. Hrankowski is principal in his company, Clinical Coaching Associates, which specializes in helping other dentists to improve their clinical and patient communication skills.

With the advent of new instruments, these inconveniences have all but been eliminated. I personally use the Artex System (Jensen Dental, North Haven, CT<sup>1</sup>.) With the Artex face bow, an accurate registration can be done in as little as thirty seconds and can easily be taught to auxiliary personnel.

With a special key, any number of Artex articulators can be calibrated to within nine microns of each other. The biggest advantage this has over other systems is that the dentist really only needs one articulator (as long as the lab has one too). Cases can be sent back and forth from the office and lab without the need to send the articulator itself. This has obvious cost-saving ramifications.

In choosing an articulation system, several factors must be considered. It is safe to say that all semi-adjustable instruments on the market today are within the acceptable limits of accuracy. In the long run, the choice boils down to ease of use, cost and plain old personal preference.

It's true that the adoption of any new procedures and equipment require an initial investment in both time and money. To make sense, there must be clear evidence as to the benefits and advantages. So why use a semi-adjustable articulator?

- Greater accuracy
- Savings in chairside adjustment time
- Eliminate iatrogenic occlusal interferences
- Improved doctor/laboratory relations
- Increase patient's perception of care and skill level
- Revenue source for the practice and laboratory

...and finally, because it is the right thing to do.

## References

- Dawson, P. [Evaluation, Diagnosis and Treatment of Occlusal Problems], ed 2. St. Louis, C.V. Mosby, 1989.
- Lundeen, H. and Gibbs, H. [Advances in Occlusion], Boston, John Wright, PSG, Inc. 1982.
- Ramfjord, S and Ash, M. [Occlusion], ed 2. Philadelphia, W.B. Saunders, 1971
- Becker, I. [Occlusion as a Causative Factor in TMD - Scientific Basis to Occlusal Therapy], New York State Dental Journal, November, 1995

<sup>1</sup>North American distributor:

Jensen Dental, 50 Stillman Road, North Haven, CT 06473, (800) 243-2000

