

Clinical Predictability with Dual-arch Impressions: Plastic Trays Are Not the Answer



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Since the majority of crown-and-bridge impressions sent to the laboratory are of single-tooth preparations, the dual-arch impression technique offers many benefits for these types of cases. The dual-arch impression impresses the preparation site, the opposing arch and registers the bite registration all at once. It can be used for more than one preparation, and is more economical than taking a full arch impression with polyvinyl siloxane combined with a separate impression of the opposing arch and separate bite registration. The dual-arch technique, of course, takes less chair time. It is also easier for the patient with less chance for gagging.

Ideally the dual-arch impression should be used in cuspid rise occlusions, as group function cannot be reproduced on a simple hinge articulator that is often used in the laboratory for these types of impressions. The dual-arch impression should not be used when impressing a terminal tooth in the arch, as many of the plastic articulators used by laboratories can flex creating occlusal discrepancies on the terminal tooth crown.¹ It is imperative that we match the accuracies of the various materials that we use² and since there can be a large discrepancy in dimensional accuracy between bite registrations taken with polyvinyl siloxane bite registration materials and alginate derived stone models, this often results in an open bite mounting of the case and hyper occlusion on the prosthesis. Alginate substitutes can create a much more accurate relationship between the PVS bite registration and the casts derived from these impressions. The all-in-one impression is equivalent in marginal accuracy and superior in occlusal inter-digitation to systems using a single upper or lower impression. Studies show that casts made from dual-arch impressions provide more accurate maximal intercuspal relationships than mounted casts from single-arch impressions resulting in less chair-side time seating and adjusting prostheses.³

Many dual-arch trays, currently being used for dual-arch impressions are plastic. Accuracy of our impressions is compromised when these plastic dual-arch trays flex during the impression taking process resulting in consistent discrepancies of 180-210 microns.⁴ This flex can be caused by the high side walls of the plastic trays hitting the palatal tissues, maxillary tuberosities, or tori present in the patient's oral cavity. Flex can also occur due to outward pressure on the plastic tray when there is interference in the retro-molar pad area. The very act of swallowing during the impression-taking procedure can cause the tongue to repeatedly displace the lingual wall of the tray during polymerization creating distortion. As well, the thicker rheology of high viscosity impression materials can cause the plastic tray to flex away from the tooth preparation.⁵ Therefore, when the tray is removed, the plastic memory of the tray will create an inward pressure, and depending on the stiffness of the heavy body used, the dies can be distorted mesio-distally, creating marginal fit problems as well as interproximal contact issues.

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Second opinions are common in health care; whether a doctor is sorting out a difficult case or a patient is not sure what to do next. In the context of our magazine, the first opinion will always belong to the reader. This feature will allow fellow dental professionals to share their opinions on various topics, providing you with a "Second Opinion." Perhaps some of these observations will change your mind; while others will solidify your position. In the end, our goal is to create discussion and debate to enrich our profession.

— Thomas Giacobbi, DDS, FAGD
Dentaltown Editorial Director

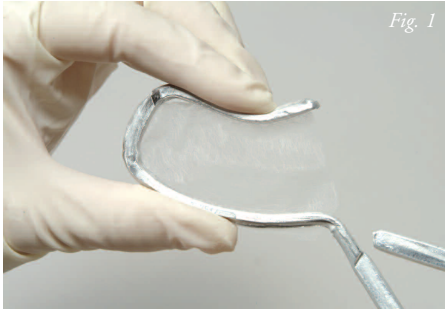


Fig. 1

The answer is to use a metal tray, which eliminates flex. The Quad Tray Xtreme (Clinician's Choice) (Figure 1) as reviewed by Dr. Gordon Christensen,⁶ is designed to complement the dual-arch impression technique and to eliminate the distortion that is common with plastic dual-arch impression trays. Because the tray is fabricated from aluminum, the tray has no elastic memory to create distortion in the final impression. As well, the low sidewalls cannot cause distortion due to axial roll or outward flex, and the design incorporates a wide arch, very thin retro-molar area and is adjustable. Therefore, when combined with the correct heavy body PVS impression material, the impression is dimensionally accurate and stable for an indefinite period of time. Using a "technique designed" specific heavy body is critical to success.

If a clinician desires reproducible accuracy and consistent results, the impression material used with a dual-arch tray should be stiffer than the material that is used for full-arch impressions, which are supported by a walled tray that encompasses the entire arch. When a full arch impression is taken, the heavy body has to support the light body, but by necessity, it has to have the ability to flex significantly to allow withdrawal of the impression from the oral cavity. Since the dual-arch impression is essentially a "platform" with no circumferential walls like a traditional tray, the heavy body must be formulated differently to maximize predictability in our crown and bridge prostheses. It has to be very rigid when polymerized, since it essentially takes on the function of a tray to support the light body. It also has to be very stiff to resist the deformation forces of pouring up the model in the laboratory. In a recent American Dental Association Professional Product Review⁷, the ADA makes the recommendation that heavy bodies, which demonstrate a strain in compression of less than two percent (a very stiff impression material), would work well with a closed bite tray. In my office for dual arch impressions I use Inflex impression material (Clinician's Choice), which I've found has a very low strain in compression (high stiffness), while still demonstrating the flow necessary to give reproduction of detail. As well, when using the matching light body the rheology of this heavy body material has been formulated to allow for all of the preparation to be captured in light body, rather than just the gingival collar, resulting in a more accurate fit, with less strain on the physical characteristics of the cementing medium.

With such a stiff material, when the impression is set, the final impression is held against the prepared arch and the patient is asked to open. Once the opposing arch has been released from the impression, the impression is then carefully rocked from side to side to remove. It must be noted that the patient should not clench during this procedure, as occlusal prematurities on teeth adjacent to the preparation can cause these teeth to move during the impressioning, creating an inaccuracy. Put a hand on the masseter, and when the clinician feels the masseter tighten, make sure the patient releases the pressure, but holds the bite lightly. Since the patient cannot always close accurately, especially when anesthetic has been injected, a reference point should be marked anteriorly before anesthesia. The author uses a small marker to indicate the midline and anterior overbite before the injection takes place, with the patient guided back to this position during the impression.

The clinical success of the dual-arch impression is dependent on the combination of proper metal tray and "technique driven" impression material. The laboratories see far too many plastic trays with obvious burn through of hard or soft tissues, reflecting a probable distortion, but the fear of losing clients often dissuades them from returning the case for a new impression. What the laboratories of course cannot see is the possible mesio-distal discrepancies caused by memory flex of the plastic tray. In an era where economic turmoil is a reality, neither the laboratory nor the clinician can afford the time, frustration, of the cost of remakes or the time taken to "adapt" an ill-fitting prosthesis. ■

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Author's Bio

Dr. Len Boksman graduated from the Faculty of Dentistry, University of Western Ontario with a DDS in 1972. Boksman then practiced in his hometown of Burlington, Ontario, Canada, for seven years. In 1979 Dr. Boksman joined the Faculty of Dentistry at Western as an Assistant Professor of Operative Dentistry, shortly thereafter attaining the tenured position of Associate Professor. He completed his BSc degree in 1984 and was awarded a Fellowship in the Academy of Dentistry International. Boksman received the Dental Students Society Faculty Teaching Award in 1986. He was heavily involved in clinical research while at the faculty, and authored more than 100 articles and chapters in textbooks. In 1987 he returned to private practice full time. Len was the first International Editorial Board Member of *Reality Magazine*, and consulted for 3M/ESPE and Caulk/Dentsply for more than 20 years. In 2003 Boksman received a Fellowship in the International College of Dentists. He has served as councilor to the Ontario Dental Association and was awarded the Ontario Dental Association Award of Merit in 2005. Boksman was awarded the Alumni of Distinction Award from his alma mater in 2007. Dr. Boksman can be reached at lboksman@clinicalresearchdental.com.