

Title Page

Accurate Contact Adjustment with the Contact Marker - a new instrument

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Summary

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A new dental instrument which carries a soft graphite marker to the mouth to mark areas where restorations may fit tightly, and by means of which the actual contacting areas can be identified and adjusted. The nature of the content of the marking material and its lack of toxicity is discussed.

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The purpose of this paper is to introduce a new dental instrument which allows the most accurate adjustment of contacts between restorations, particularly porcelain restoration.

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The fit of gold restorations and their longevity has long been extolled. The ease with which gold inlays, onlays or crowns can be adjusted to fit accurately against an adjacent tooth or the opposing dentition centers around the burnishability of material. By simply dusting the contacting surfaces with a polishing wheel or micro etcher to produce a satin finish, an indicator is engineered on the material of the restoration itself which is burnished on contact and so reveals a gleam where the exact location of the contact is made. Adjusting at this exact location allows very accurate modification to achieve perfect contact.

The purpose of this paper is to introduce a new instrument, for which a patent has been filed,¹ the use of which allows equally accurate adjustment of all restorations especially porcelain. Porcelain restorations are gaining popularity, but no matter how well they are manufactured, even when computer aided (CAD/CAM) designed, there is still room for improvement in the accuracy of the contact areas. They are either tight or open, but rarely perfect first time.

Various techniques to mark or identify the contact areas have been attempted, including the use of mylar articulating paper, rouge and chloroform and dental floss. This author has found that these techniques cumbersome and in the case of floss, inaccurate. For many years graphite in pencil lead was used to mark the contacts. It is the effectiveness of this technique which resulted in the desire to engineer a way to bring a marking tip to the contact area so that we all can achieve highly accurate contact adjustments. Research has revealed that no instrumentation has been developed to date to address this clinical need. Answering this need has resulted in the

development and production of the Contact Marker.

Prototypes were fabricated and found to be really effective when a bin-angled carrier was mounted on a standard instrument handle.



Fig 1 - Contact Marker prototype

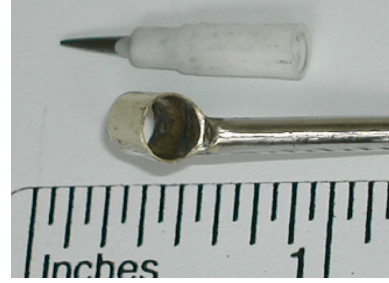


Fig 2 Contact Marker showing detail of retaining ring

A word about designing inter-proximal contacts.

Excellent contacts between restorations can be achieved if the adjacent or abutting surfaces are modified as needed when the tooth is prepared and before the impressions are taken. The best results are attained but ensuring that the planned contact areas are parallel, exactly parallel. They can be occlusally divergent, allowing wedging of the new restoration, but parallelism is better. It is also appropriate to carve and polish those surfaces so that there is a long broad contact area in the occlusal third to two thirds of the crown.

The technique

At the seating appointment, the temporary restoration is removed and after the prepared abutment of cleaned and dried. The contact marker, CM1, which carries a thin graphite marker at its tip, is the means by which the marking agent is transported to the inter-proximal contact area. The interproximal contacts are marked with the graphite tip.



Figure 3. Marking the contact with the CM1

The restoration is then gently eased onto the abutment and the graphite smear on the adjacent tooth will be transferred to the points of contact.

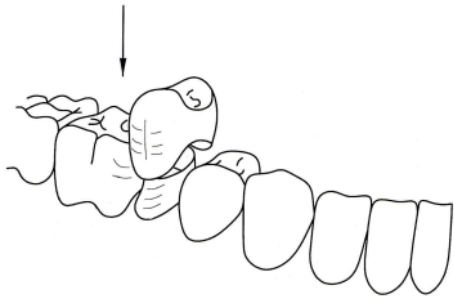


Figure 4. Trying in the new restoration

The restoration is removed and the transferred graphite marking noted as the areas of tight contact. The contact marks can be adjusted with a polishing wheel.

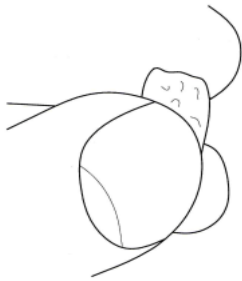


Figure 5. The transferred marks showing the contact areas.

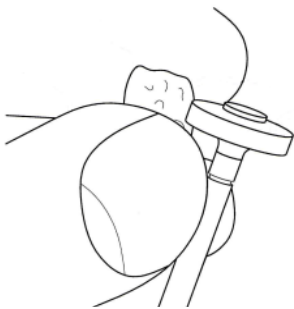


Figure 6. Adjustment with a polishing wheel.

The materials

The reusable instrument handle is made of surgical stainless steel which can sustain thousands of sterilization cycles. The pencil markers have a small plastic housing and are disposable.



Figure 7. Production version of the new instrument with graphite marker tip

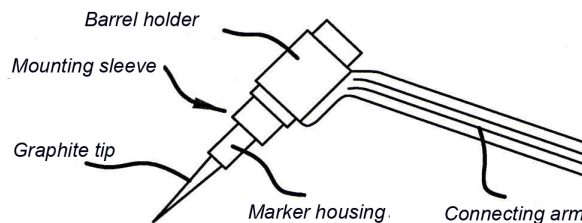


Figure 8. Detail of the carrier barrel and the marker tip in place

Industrial Analysis

Concerns over the nature of the marking material were addressed by analyzing the graphite used in the marker tips. In test report number TWNC00112367 performed by the Intertek Testing Services,² the samples were shown to comply with the U.S. Consumer Report Safety Improvement Act 2008 (H.R. 4040) Title I, Section 101 and passed the test.

The test was based on suitability for children's products containing lead, and acid digestion method was used and the total lead content was determined by Inductively Coupled Argon Plasma Spectrometry. For both the surface coating and the substrate the total lead (Pb) content was found to be less than 10 (ppm). This more than complies with and exceeds the standards set to comply with United States regulations.

The limits presently in force are:

For Surface Coating

0.06% (600 ppm) on or before Aug 14, 2009
0.009% (90 ppm) After Aug 14, 2009

For Substrate

0.06% (600 ppm) After Feb 10, 2009
0.03% (300 ppm) After Aug 14, 2009
0.01% (100 ppm) After Aug 14 2011

Abbreviations: Pb - Lead, ppm - part per million

REFERENCES

1. Patent protected data registered with the United States Patent and Trademark Office with Serial Number 12/002,375, dated December 17th 2007.
2. Intertek Testing Services Taiwan Ltd. 8F., No 423, Ruiguang Rd., Neihu District, Taipei 114, Taiwan, R.O.C. Test Report Number: TWNC00112367, Date April 01. 2009