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Digital gypsum verification index to confirm passive fit of complete arch frameworks

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The passive fit of implant-supported complete arch frameworks is critical for long-term prosthetic success.[1] Conventional resin verification indices have been commonly used; however, their inherent elasticity may permit false seating, potentially masking minor misfits. This digital gypsum verification index exploits the brittle nature and low tensile strength of dental gypsum[2] to detect even subtle adaptation discrepancies. The method is straightforward, reproducible, and seamlessly integrates into digital workflows to ensure accurate prosthetic fit verification before final delivery.

A patient with a completely edentulous maxilla restored with 6 implants supporting a complete arch framework is described. Variable implant angulations made achieving passive fit challenging, as minimal discrepancies compromised fit accuracy.

1. Fabricate milling disks by mixing Type IV dental stone (Fuji-Rock EP; GC Co) with a water/powder ratio of 0.20 in a vacuum mixer (Twister Evolution; Renfert) and pouring into a Ø98-mm white mold made with a 3D printer (Bambu Lab X1; Bambu Lab) to form a gypsum disk compatible with the milling machine (P53; Aurident).
2. Incorporate various offset values (60-μm, 90-μm, and 120-μm) based on reported accuracy ranges of digital scans[3] and when commonly used when milling complete arch frameworks (Fig. 1).
3. Reduce the milling time compared to the time used when milling metal frameworks for superior practicality and cost-effectiveness.

Figure 1. Fabrication of gypsum verification index.

4. Fabricate comparative resin frameworks with 60-μm and 90-μm offsets as control specimens.
5. Test the gypsum verification indices with offset values ranging from 60-μm to 110-μm by attempting framework seating.
6. Observe seating behavior: gypsum indices with 60-μm to 110-μm offsets will fracture upon seating, while the 120-μm offset will completely seat without fracture.
7. Determine optimal offset value: findings demonstrated that a passive fit required a 120-μm offset framework fabrication (Fig. 2).

The 120-μm offset fell within the ranges[4] mentioned in the prosthodontic literature, although long-term clinical validation is warranted. This offset has been

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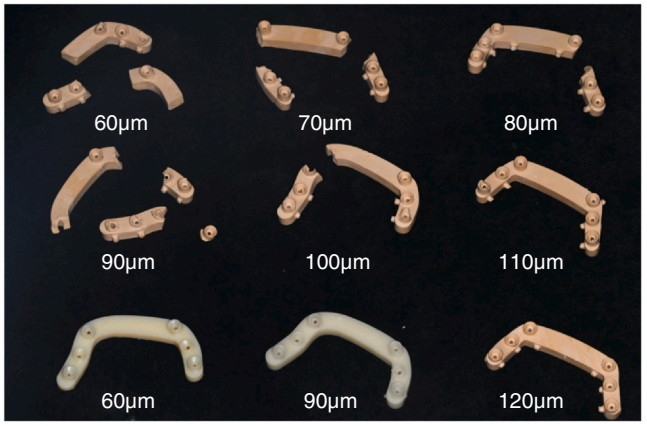

Figure 2. Framework offset determination for passive fit. Test all indices using standardized tightening sequence with multi-unit abutments tightened to 15 Ncm according to manufacturer specifications. Observe that gypsum indices with 60- to 110-µm offsets fracture during seating, while 120-µm offset achieves complete seating without fracture; resin indices inadequate for verification.

found to be particularly appropriate for complete arch prostheses, where different implant angulations necessitate larger compensatory tolerances.

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