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**AvaDent™... the digital platform that is changing removable dentistry forever!**

AvaDent™ Revolutionary Technology brings the precision, speed and profitability of digital process automation to removable dentistry. Developed by an international team of leaders in the digital dentistry field, AvaDent™ represents a paradigm shift in removable prosthetics making it possible for dentists to offer their patients a precise fitting, aesthetic denture in as few as two appointments.

AvaDent™ is the first to introduce a digital prosthetic using **Computer-Aided Engineering (CAE)**. CAE is a process that goes far beyond mere **CAD/CAM** fabrication by developing sophisticated, scientific algorithms to create a comprehensive digital platform. This digital platform drives a level of control and consistency never before possible while ensuring that all clinical protocols are met. With AvaDent™, the dental professional has the ability to create a prosthetic completely within a digital environment.

AvaDent™, whose name is derived from **Ava** meaning rebirth and **Dent** meaning dentition, allows dentists to offer a digital denture based on accepted clinical protocols, using standard clinical procedures, with no computer skills or capital investment required. To date over 1,500 practices in the US and Canada are offering AvaDent™ Digital Dentures to their patients.

AvaDent™ offers a full line of treatment options including complete over complete, single arch, implant retained and immediate dentures.

Also unique to AvaDent™ is the all-important AvaDent™ digital record that allows the dentist to offer their patients a new degree of convenience and security never before possible. If an AvaDent™ is broken or lost an identical AvaDent™ can be fabricated without patient involvement and sent directly to the dentist.

The AvaDent™ digital record also allows the dentist, for the first time, to create a removable “treatment plan” that offers their patients the promise of uncompromised quality and on-going oral care, while increasing patient retention for the practice. It is a treatment plan that can start by offering patients an AvaDent™ with exceptional fit and aesthetics, to an implant retained AvaDent™ for greater function and stability, to a host of future breakthrough products and services... Future products and services made possible only because the AvaDent™ digital record is able to transform a non-repeatable, removable procedure into a consistent, economical, convenient, repeatable process.

We are pleased to announce that AvaDent™ has been selected as a **Top 100 Product** by the readers of **Dentistry Today**, has won the **Townie Choice Award for Best New Product** and is the recipient of the **“Best of Class” Technology Award** from **The Pride Institute**.

AvaDent™ Digital Dentures are manufactured in the Netherlands. For information about training webinars or AvaDent™ Digital Dentures call G.D.S. Europe (088 - 84 84 150) or go to [www.globaldentalscience.eu](http://www.globaldentalscience.eu)
About AvaDent™

Doctor Benefits:

✔ EASY: No more stone casts or wax occlusion rims. Uses standard clinical procedures - no computer skills required.

✔ FAST: Completed dentures in as few as 2 appointments. Stored digital records allow fabrication without clinical records.


Patient Benefits:

✔ Finished dentures in as few as 2 appointments.

✔ Computer precision improves fit and reduces sore spots.

✔ Bio-hygienic denture base resin helps reduce sore spots and “denture breath”.

✔ Permanent Digital Record for patient security and convenience

✔ Made in the Netherlands.
The Digital Denture Process:

Clinical Records
Using our simple impression taking technique and our proprietary AvaDent Anatomical Measurement Device (AMD) dentists can use standard clinical procedures to gather all the necessary clinical information in just one easy appointment. The impression, AMD and prescription are then sent to the lab for completion.

Scanning
The impressions and the AMD are scanned to create a digital file.

Virtual Dentures
The files are merged and a virtual denture is created.

Tooth Selection & Occlusal Scheme
Your selected teeth and occlusion scheme are used by our proprietary software to automatically create the optimal denture setup and occlusion. In addition, AvaDent™ digital controls allow for functional and aesthetic adjustments never before possible.

Milling the Base
Our digital file is sent to the computer milling station where the AvaDent™ is milled from a prepolymerized disk using a proprietary process. This process results in a significantly more biohygienic denture than can be achieved using traditional fabrication methods.

Completed Dentures
Processed within micron tolerances, AvaDent offers you and your patients exceptional function, aesthetics and convenience.
**Required Clinical Steps:**

<table>
<thead>
<tr>
<th>Step</th>
<th>Conventional</th>
<th>AvaDent™ Digital</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostic Impressions</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Diagnostic Casts</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Custom Tray</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Final Impression</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Master Casts</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Record Bases &amp; Wax Rims</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Records: OVD, CR, Lip Support, Midline, Smile Line, Incisal Edge Line, Posterior Palatal Seal</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Facebow Transfer</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Teeth Mold &amp; Shade Selection</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Maxillary Anterior Teeth Set Up</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Maxillary Anterior Teeth Try In</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Mandibular Anterior Teeth and All Posterior Teeth Set Up</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Clinical Evaluation of Teeth in Wax and Verify Occlusion</td>
<td>✓</td>
<td>AvaDent™ ATI*</td>
</tr>
<tr>
<td>Preservation of Facebow Recorded Mounting</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Remounting Mandibular Cast</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Processing Acrylic Resin</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Clinical Remounting</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Adjustment &amp; Placement</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

*AvaDent™ Advanced Try-In is an optional step.*
Precision and Accuracy Comparisons:

<table>
<thead>
<tr>
<th>Opportunities for Errors</th>
<th>Conventional</th>
<th>AvaDent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volumetric shrinkage of Impression</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Volumetric expansion of casts</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>Cast mounting errors</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>Acrylic resin denture base shrinkage</td>
<td>✓</td>
<td>-</td>
</tr>
</tbody>
</table>

*The Accuracy of the CAD/CAM System for Fabricating Complete Dentures:* M. Kanazawa, Y. Sato, S. Minakuchi, K. Ohya, Y. Kaiba, and N. Ohbayashi, Tokyo Medical & Dental University, Japan.

Time Comparisons:

<table>
<thead>
<tr>
<th></th>
<th>Conventional</th>
<th>AvaDent</th>
<th>Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Visits</td>
<td>5 - 6</td>
<td>2</td>
<td>3 - 4 visits</td>
</tr>
<tr>
<td>Chairside Time</td>
<td>~ 3 hours</td>
<td>~ 1 ½ hours</td>
<td>50%</td>
</tr>
<tr>
<td>Laboratory Time*</td>
<td>~ 7 hours</td>
<td>~ ½ hours</td>
<td>90%</td>
</tr>
<tr>
<td>Total Fabrication Time</td>
<td>~ 30 days</td>
<td>~ 10 days</td>
<td>~20 days</td>
</tr>
</tbody>
</table>

* Excluding transportation

Ease of Duplication Comparison:

**Conventionally Fabricated Dentures = 5 - 6 VISITS**

**AvaDent™ CAD/CAM Fabricated Dentures = 1 CLICK**
AvaDent™ Complete over Complete Dentures

AvaDent™ Digital Dentures are computer-designed using algorithms that are based on time tested removable principles and traditional anatomical measurements and landmarks to achieve a perfect set-up in seconds. AvaDent™ Digital Dentures are precision-milled from a patented bio-hygienic puck of acrylic and manufacturers’ teeth are bonded into the milled pockets.

AvaDent™ Dentures (AD)

AvaDent™ Digital Dentures are available for single maxillary or mandibular arch cases.

AvaDent™ Implant Overdentures

AvaDent™ Digital Dentures makes offering implant retained over-dentures to your patients convenient and economical. Can be used with chair side pick-up systems and optioned with most denture orders, use order code: IMPLANT.

AvaDent™ Immediate Dentures (AID)

The AvaDent™ Immediate Denture offers all the advantages of a standard AvaDent™ Digital Denture for immediate patients. Additionally, it can be part of a comprehensive system that offers you a series of clinical deliverables from immediate dentures to provisional dentures to a verification / reduction guide to a definitive AvaDent™ all within a 100% digital environment.

AvaDent™ Base Plate (ABP)

The AvaDent™ Base Plate is computer-designed and then precision-milled from AvaDent’s proprietary no-shrink acrylic pucks. It is the ideal base for you to create your final set-up.
AvaDent™ Provisional Denture (APD)
The AvaDent™ Provisional Denture is created with the exact same precision parameters as an AvaDent™ Digital Denture with one significant difference. Instead of using manufacturers’ denture teeth, the APD teeth are 100% milled from an added layer of tooth colored acrylic.

AvaDent™ Conversion Denture (ACD)
The AvaDent™ Conversion Denture is a fully milled prosthesis. During surgery the ACD is used to properly stabilize and orient the prosthesis to the tissue. Implant surgery is then performed and final implant placement is completed. The ACD is seated and secured to the abutment copings with resin. The ACD is removed, the struts are cut away and it becomes the AvaDent™ Provisional Hybrid.

AvaDent™ White Scanning Guide (AWSG)
The AvaDent™ White Scanning Guide has fully milled dentition. Created from the supplied clinical records, it is an exact duplicate of the proposed final AvaDent™ and is used to determine the aesthetic and functional placement of teeth and to assist in the evaluation of dimensional space, including tissue height, appropriate OVD and bar design.

AvaDent™ Clear Treatment Prosthesis (ACTP)
The AvaDent™ Clear Treatment Prosthesis is a clear milled guide with full dentition. Created from the supplied clinical records, it is an exact duplicate of the proposed final AvaDent™ and is used to determine the aesthetic and functional placement of teeth and to assist in the evaluation of dimensional space, including tissue height, appropriate OVD and bar design.

For more information on AvaDent products and procedures visit our professional website at: [www.avadent.nl](http://www.avadent.nl)
“As a dentist I am impressed with the never-before-possible functional and aesthetic controls I have with Avadent. The most amazing thing to me about this whole technique is the tracing guide. It’s truly revolutionary”

Jochem de Rooij, ????

“I especially like the 2-stop appointments: 1 for all the impressions and measurements and 1 for the delivery. Patients especially like the excellent retention and fantastic fit.”

Maarten van der Horst, M.Sc.; Parodontoloog NVvP; Implantoloog NVOI, Coördinator Implantologie PPRD programma UMC St. Radboud Nijmegen.

“My first Avadent had the perfect fit and my patient was very satisfied with the aesthetics. It’s such an easy denture for both, the patient and me!”

Hanneke Polderman, ???
Items included in this section:

A. Final Impressions Upper & Lower Clinical Checklist
B. Complete over Complete AMD Clinical Checklist
C. Single Arch with tracing tray Clinical Checklist
D. Single Arch without tracing tray Clinical Checklist
E. Immediate Dentures Clinical Protocol
F. AART Clinical Protocol

You can view these and other training resources on the AvaDent professional website at: www.avadent.nl

For more information on AvaDent products and procedures visit our professional website at: www.avadent.nl
1. Make PVS cast from existing denture.

2. Choose correct size tray. Place tray in hot water (160°-170° Fahrenheit) for 60 seconds until tray is malleable.

3. Thermo-form trays to PVS cast.

4. Trim trays borders 2mm short of border depth.

5. Apply adhesive to tray.

6. Using AvaDent Bite Registration material, place stops in impression tray and take impression.

7. Trim stops not to interfere with border molding material.

8. Express AvaDent Border Molding material along entire edge of prepared border, then cover entire tray.

9. Insert tray into mouth and perform border movements then inspect impressions for tray exposures and overall quality, correct if necessary.

10. Apply light body AvaDent Impression material wash sufficient to complete final impression.

11. Insert tray into mouth and perform border movements.

12. Inspect impressions for tray exposures and overall quality, correct if necessary.
<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Make PVS cast from existing denture.</td>
</tr>
<tr>
<td>2.</td>
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</tr>
<tr>
<td>3.</td>
<td>Thermo-form trays to PVS cast.</td>
</tr>
<tr>
<td>4.</td>
<td>Trim trays borders 2mm short of border depth.</td>
</tr>
<tr>
<td>5.</td>
<td>Apply adhesive to tray.</td>
</tr>
<tr>
<td>6.</td>
<td>Using AvaDent Bite Registration material, place stops in impression tray and take impression.</td>
</tr>
<tr>
<td>7.</td>
<td>Trim stops not to interfere with border molding material.</td>
</tr>
<tr>
<td>8.</td>
<td>Express AvaDent Border Molding material along entire edge of prepared border, then cover entire tray.</td>
</tr>
<tr>
<td>9.</td>
<td>Insert tray into mouth and perform border movements then inspect impressions for tray exposures and overall quality. Correct if necessary.</td>
</tr>
<tr>
<td>10.</td>
<td>Apply light body AvaDent Impression material wash sufficient to complete final impression.</td>
</tr>
<tr>
<td>11.</td>
<td>Insert tray into mouth and perform border movements.</td>
</tr>
<tr>
<td>12.</td>
<td>Inspect impressions for tray exposures and overall quality. Correct if necessary.</td>
</tr>
</tbody>
</table>

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This checklist is a quality control check and alerts you to critical steps required to minimize potential errors in your AvaDent Digital Record and Final AvaDent.
1. Establish OVD and mark nose (or filtrum) and chin with permanent marker for future reference.

2. Select correct sized maxillary AMD tray. Trim if necessary.

3. Apply AvaDent Adhesive to tray.

4. Fill tray with AvaDent Border Molding material.

5. Position tray so it seats completely onto the ridge, is centered on patient's midline, is horizontally correct to patient's inter-pupillary line and is parallel to mandible.

6. Remove tray, trim excess impression material and/or tray that would otherwise distort natural lip contour.

7. Wash with AvaDent Impression material and re-impress. Review and compare integrity of Final Impressions and AMD impressions. Impressions should be similar. Correct if necessary.

8. Remove lip support and reinsert maxillary tray.

9. Choose correct mandibular tray and insert tray for verification of fit. Verify position of central bearing pin. Rehearse border movements to ensure tray is adequately positioned to record the Gothic Arch tracing. Trim tray if necessary.

10. Apply AvaDent Adhesive to tray.

11. Using AvaDent Border Molding material, completely fill tray and position tray so that tracing table is aligned with the desired horizontal plane of occlusion and parallel to the mandible and the maxillary tray.

12. Remove tray, wash with AvaDent Impression material and re-impress.

13. Remove tray, trim excess impression material and/or tray that would otherwise distort natural lip contour.

14. Review and compare integrity of Final Impressions and AMD impressions. Impressions should be similar, correct if necessary.

15. Re-insert both trays and observe that trays are parallel and not touching. Trim if necessary.

16. Establish OVD by adjusting central bearing pin with the AvaDent Adjustment Tool. Do not allow mandible to rotate forward around central bearing pin. Observe trays are still parallel A/P and laterally.

17. Remove maxillary tray and finger tighten central bearing pin lock nut to secure position, and stabilize the central tracing pin.


QC = This quality control check alerts you to critical steps required to minimize potential error in your AvaDent Digital Record and Final AvaDent.
19. Replace trays and perform gothic arch tracing.

20. Remove mandibular tray. Create divot at apex of tracing arrow with bur.

21. Re-insert tray and relocate central bearing pin into divot.

22. Express AvaDent Bite Registration material liberally into space between trays.

23. Remove AMD, visually verify central bearing pin has remained in divot. Correct if necessary.

24. Trim excess impression material and/or trays which may cause un-natural contour of facial features.

25. Replace lip support and adjust to correct lip contour.

26. The lips should now close around AMD comfortably and AMD should not be discernible when in patient's mouth. This will be the basis for your final aesthetic verification.

27. Insert Horizontal Occlusal Plane to establish horizontal plane of occlusion.

28. Record number on Rx and remove Horizontal Occlusal Plane.

29. Mark midline on lip support with permanent marker.

30. Draw incisal edge across lip support with permanent marker.

31. Align Aesthetic Transparency to midline and incisal edge and affix.

32. Record Aesthetic Transparency size and gingival height on Rx.

33. Insert AMD. Ask patient to smile. Verify aesthetics, including vertical, midline, incisal edge and overall facial features. AMD should appear neutral in mouth while at rest. Make aesthetic changes if necessary.

34. Take photos of patient at rest and smiling.

35. Complete Rx.

36. Send Final Impressions, AMD, photos and completed Rx to laboratory.

www.avadent.nl
1. Establish OVD and mark nose (or filtrum) and chin with permanent marker for future reference.

2. Select correct sized maxillary AMD tray. Trim if necessary.

3. Apply AvaDent Adhesive to tray.

4. Fill tray with AvaDent Border Molding material.

5. Position tray so it seats completely onto the ridge, is centered on patient’s midline, is horizontally correct to patient’s inter-pupillary line and is parallel to mandible.

6. Remove tray and trim excess impression material and/or tray that would otherwise distort natural lip contour.

7. Wash with AvaDent Impression material and re-impress. Review and compare integrity of Final Impressions and AMD impressions. Impressions should be similar. Correct if necessary.

8. Choose correct mandibular tray and apply AvaDent Adhesive to tray.

9. Using AvaDent Bite Registration material, fill posterior portion of tray.

10. Position tray over opposing dentition leaving lower anterior teeth exposed.

11. Establish OVD by adjusting central tracing pin until lower edge of lip support displays proper vertical overlap and trays are not touching. Trim trays if necessary.

12. Finger tighten central tracing pin locking nut to secure position, and stabilize the central tracing pin.

13. Remove lip support.


15. Replace trays and perform gothic arch tracing.

16. Remove mandibular tray and create divot at apex of tracing arrow with bur.

17. Re-insert tray and relocate central tracing pin into divot.

18. Express AvaDent Bite Registration material liberally into space between trays.
1. Remove AMD and visually verify central tracing pin has remained in divot and trays are not touching. Correct if necessary.

2. Trim excess impression material and/or tray which may cause un-natural contour of facial features.

3. Replace lip support. Establish final lip contour.

4. The lips should now close around the AMD comfortably and AMD should not be discernible when in patient’s mouth. This will be the basis for your final aesthetic verification.

5. Insert Horizontal Occlusal Plane to establish horizontal plane of occlusion.

6. Record number on Rx and remove Horizontal Occlusal Plane.

7. Mark midline on lip support with permanent marker.

8. Draw incisal edge across entire lip support with permanent marker. Confirm desired vertical overlap as identified with incisal line.

9. Align Aesthetic Transparency to midline and incisal edge and affix.

10. Record Aesthetic Transparency size and gingival height on Rx.

11. Remove AMD. Wash entire mandibular tray with AvaDent Border Molding material.


13. Remove AMD. Ensure opposing is captured. Trim excess impression material that may cause un-natural contour of facial features. If complete opposing dentition and ridge are not present in the AMD please take a separate impression and pour a stone model.


15. Take photos of patient at rest and smiling.

16. Complete Rx.

17. Send final impression, AMD, photos and completed Rx to laboratory.

www.avadent.nl
1. Establish OVD and mark nose (or filtrum) and chin with permanent marker for future reference.

2. Select correct sized maxillary AMD tray, trim if necessary.

3. Apply AvaDent Adhesive to tray.

4. Fill tray with AvaDent Border Molding material.

5. Position tray so it seats completely onto the ridge, is centered on patient’s midline, is horizontally correct to patient’s inter-pupillary line and is parallel to mandible.

6. Adjust lip support to final lip contour.

7. Remove tray and trim excess impression material and/or tray that would otherwise distort natural lip contour. Re-insert tray.

8. Wash with AvaDent Impression material and re-impress. Review and compare integrity of final impressions and AMD impressions. Impressions should be similar. Correct if necessary.

9. Insert Horizontal Occlusal Plane to establish horizontal plane of occlusion.

10. Record number on Rx and remove Horizontal Occlusal Plane.

11. Mark midline on lip support with permanent marker.

12. Draw incisal edge across lip support with permanent marker. Confirm desired vertical overlap is identified with incisal line.

13. Align Aesthetic Transparency to midline and incisal edge and affix.

14. Record Aesthetic Transparency size and gingival height on Rx.

15. Remove AMD. Apply AvaDent Adhesive to inferior surface of tray.

16. Place AvaDent Bite Registration stops in each tuberosity area.

17. Establish OVD by manipulating mandible into stops until desired vertical overlap is achieved. Allow material to polymerize.

18. Remove AMD and wash entire mandibular tray, including stops, with AvaDent Border Molding material.

20. Remove AMD. Ensure opposing is captured. Trim excess impression material that may cause un-natural contour of facial features. If complete opposing dentition and ridge are not present in the AMD please take a separate impression and pour a stone model.

21. Insert AMD and ask patient to smile. Verify aesthetics including: vertical, midline, incisal edge and overall facial features. AMD should appear neutral in mouth while at rest. Make aesthetic changes if necessary.

22. Take photos of patient at rest and smiling.

23. Complete Rx.

24. Send Final Impressions, AMD, photos and completed Rx to laboratory.

---

This quality control check alerts you to critical steps required to minimize potential error in your AvaDent Digital Record and Final AvaDent.

www.avadent.nl
**AvaDent™ Immediate Dentures**

Only AvaDent™ offers the dental professional a simplified process for delivering an immediate denture as well as a comprehensive immediate system that allows the them to treatment plan a final definitive AvaDent™ all within a 100% digital environment.

As with all immediates the process starts by taking impressions and gathering inter-occlusal records. With AvaDent™, this is all done at the first appointment. (See impression taking and creating an inter-occlusal record options below.)

The impressions and the records are then sent to the laboratory where they are scanned, a virtual model is created and the remaining teeth are digitally removed from the virtual model. An AvaDent™ Immediate Denture is then designed and the digital record is stored for future use. The AvaDent™ Immediate Denture is unique in that it is precision-milled with a larger, deeper intaglio surface, removing the base of the teeth and excess acrylic material from inside the ridge so as to maintain optimal occlusion. This creates a thinner, light-weight denture designed to accommodate the higher and/or uneven ridges generally found with immediate cases.

If bone reduction is required, the doctor now has the option to order an AvaDent™ Bone Reduction Guide (ABRG). The ABRG is a clear, milled, AvaDent™ baseplate used to assist in alveoloplasty and tissue contouring to help ensure proper seating of the AvaDent™ Immediate Denture. The ABRG is digitally reduced and precision-milled to exactly match the design of the AvaDent™ Immediate Denture. An e-mail showing a digital arch with the proposed reduction is sent to the doctor for approval or modification prior to milling.

The AvaDent™ Immediate Denture is then sent to the doctor, the remaining teeth are extracted from the patient, the ABRG is utilized to remove and contour excess tissue and the denture is seated. As the tissue heals over the next several months, the denture is lined and adjusted.

In some cases this becomes the final denture. However, for the dental professional and patient who want the function and aesthetics of a definitive AvaDent™ after the healing process is complete, the AvaDent™ Immediate Denture System offers an extraordinary solution.

Using the AvaDent™ digital record, an AvaDent™ Provisional Denture is created and sent to the dental professional. The AvaDent Provisional Denture is created with the exact same precision parameters as an AvaDent™ Digital Denture with one significant difference. Instead of using manufacturers’ denture teeth, the APD teeth are 100% milled from an added layer of tooth colored acrylic.

Once the extraction sites have healed, the AvaDent™ Provisional Denture can be lined, equilibrated and worn by the patient as a temporary prosthesis until the definitive AvaDent™ is completed.

The adjusted AvaDent™ Immediate Denture along with an occlusal bite record are then sent to the lab. They are scanned, merged with the existing file and the Definitive AvaDent™ Digital Denture is fabricated.
The final step is the delivery of the definitive AvaDent™ Digital Denture to the patient. As with all AvaDents, the permanent digital record is retained.

### Impression Technique for AvaDent™ Immediate Denture

1. Choose or create an impression tray that allows you to capture the remaining dentition, the edentulous ridge (if any) and the appropriate border depth to stabilize the AvaDent™ Immediate Denture.

2. Properly prepare tray to allow for space of existing dentition by placing 1.0 - 3.0 mm of relief wax over existing dentition and try in the tray. The wax will be removed prior to impression.

   **Tip:** Place utility wax around the cervical of a recessed tooth and any undercuts to allow for easy removal of tray. Alternatively, use light cured block-out resin.

3. Express AvaDent™ Border Molding Material onto the borders of the tray. Express one rope of material just below the apex of the tray border all the way around the tray. Express a second rope on top of the apex of the border all the way around the tray. Fill the remainder of the tray with adequate amount of border molding material.

4. Express AvaDent™ Border Molding Material around the existing dentition.

5. Insert the filled tray into the mouth and perform the necessary border molding movements to capture the anatomy of the remaining dentition, the edentulous ridge *(if any)* and the border.

6. Make a wash impression using AvaDent™ Impression Material to capture additional anatomy of the edentulous ridge, border or dentition if necessary.

### Option for Impression of Class III Mobile Teeth

In cases where the teeth are extremely mobile, choose or create an impression tray that allows you to capture the remaining dentition, the edentulous ridge *(if any)* and the appropriate border depth to stabilize the AvaDent™ Immediate Denture. Place utility wax around the cervical portion of existing dentition to allow for easy removal of tray. Make an alginate impression and pour a stone cast. Depending on the remaining dentition scenario, the inter-occlusal record will be created as described below and returned with the stone casts.

*Please DO NOT remove teeth from casts!*

### Creating an Inter-Occlusal Record

There are many possible scenarios which may present in an immediate denture case. Careful assessment needs to be made concerning the remaining dentition as well as the OVD, centric relation and aesthetic records. There are four principle categories from which a record is created. *(See list below)*  

An accurate inter-occlusal record is required for the successful design and completion of the AvaDent™ Immediate Denture. This record can be created with the AMD or a modified version of it. The following examples show a variety of resourceful solutions.

**Type 1.** Has OVD, sufficient intercuspation and aesthetic reference available.

**Type 2.** Has OVD, posterior teeth present and no aesthetic reference available.

**Type 3.** No OVD, available anterior teeth and has aesthetic reference available.

**Type 4.** No OVD and no aesthetic reference available.
Immediate Dentures

Type 1. OVD and Aesthetic Reference Available

When a patient has sufficient remaining opposing teeth that interdigitate and an OVD position and CR can be confirmed or established, make an inter-occlusal record with AvaDent™ Bite Registration Material to record the position making sure to capture the anatomy of the remaining dentition and the edentulous ridge (if any). Case will be designed using existing aesthetic references unless otherwise indicated.

Type 2. OVD and No Aesthetic Reference Available

When a patient has sufficient remaining opposing teeth that interdigitate and an OVD position and CR can be confirmed or established, make an inter-occlusal record with AvaDent™ Bite Registration Material. Prior to placing the bite registration material, hold in place the Compact AMD in the appropriate anterior position and incorporate it into the bite registration material. Establish aesthetic records including lip support midline, horizontal plane incisal edge, mold size and cervical line on the Compact AMD. If the Compact AMD cannot be accommodated, attach the lip support alone. The mandibular AMD tray is also adapted according to the remaining dentition and appropriate AMD procedure is followed for AvaDent™ complete over complete or single arch denture.

Type 3. No OVD, Available Anterior Teeth

When a patient has remaining anterior dentition and the aesthetic record is present including midline, incisal edge, horizontal plane, make an inter-occlusal record with AvaDent™ Bite Registration Material to record the correct OVD and centric relation making sure to capture the anatomy of the remaining dentition and the edentulous ridge (if any). Modified AMD trays may be used to establish correct OVD and centric relation if applicable and AvaDent™ complete over complete or single arch protocol is followed.
Type 4. No OVD, No Aesthetic Reference

When a patient has no aesthetic reference with the remaining dentition and the teeth do not interdigitate confirming OVD or centric relation, use an appropriately modified AMD to establish the correct inter-occlusal record. Follow existing AvaDent™ protocol for AvaDent™ complete over complete or single arch for creating the appropriate AMD. Establish aesthetic records including OVD, centric relation, lip support, midline, horizontal plane incisal edge, mold size and cervical line.

Extraction Alveoloplasty, Tissue Contouring and AvaDent™ Immediate Denture Insertion

AvaDent™ Bone Reduction Guide (ABRG) Option

If bone reduction is required, the doctor now has the option to order an AvaDent™ Bone Reduction Guide (ABRG). The ABRG is a clear AvaDent™ base-plate, surgical guide used to perform an alveoloplasty and tissue contouring during immediate and implant cases.

An e-mail showing a digital arch with the proposed reduction is sent to the doctor for approval or modification prior to milling. The AvaDent™ Immediate can now be designed for optimal aesthetics. The ABRG features easy cut away surgical guide cutouts.

AvaDent™ Immediate Denture (AID)

The AvaDent™ Immediate Denture is a unique milled prosthesis specifically designed to accommodate a higher ridge and a soft reline. As the healing process continues over time, relines and adjustments can be made to this healing denture as is customary.

AvaDent™ Provisional Denture (APD) Option

The AvaDent™ Provisional Denture is a milled duplicate of the original AvaDent™ Immediate Denture which will be worn as an interim denture until the definitive AvaDent™ is completed. Once healing has taken place, it will be re- lined chair side, adjusted occlusally and worn until the definitive AvaDent™ Denture arrives.
Optionally, the adjusted AvaDent™ Provisional Denture can be relined, adjusted and sent to the lab as the design for the creation of the definitive AvaDent™ Digital Denture. The AvaDent™ Provisional Denture can remain with the patient.

**IMPORTANT:** A complete bite registration is to be included with the returned AvaDent™ Provisional Denture or AvaDent™ Immediate Denture.

**Note:** Additional adjustments may be included upon request. Instructions are indicated on the prescription and sent with the AvaDent™ Provisional Denture or AvaDent™ Immediate Denture to be finalized.

**Delivery of the definitive AvaDent™**

The AvaDent™ Immediate Denture (or AvaDent™ Provisional Denture) is scanned and merged with the original record and a definitive AvaDent™ denture is created that incorporates any changes that were required. Any additional changes that were requested in the prescription are also entered by the designing technician.

The final AvaDent™ is then milled, new teeth bonded in, finished and polished and returned for delivery. The definitive AvaDent™ is inserted, final adjustments are made and the process is complete.
The AvaDent™ Alternate Record Technique (AART)

The AvaDent™ Alternate Record Technique (AART) is an optional method which can be used to obtain the necessary records to create a new AvaDent™ Digital Denture using the patient’s existing denture. The process can be used for totally edentulous, single arch and implant retained cases. Here is a step by step process for a totally edentulous patient.

1. Assess the patient’s old dentures for vertical dimension of occlusion, the rest position, centric relation and aesthetics.

2. Duplicate the patient’s existing denture using your preferred method. The duplicate will become the template for your AART.

3. To record the vertical dimension, insert the duplicated dentures into the patient’s mouth and ensure that these are correctly seated. Record the Occlusal Vertical Dimension (OVD) and measure with an AvaDent™ caliper. Assess whether this measurement will need to be adjusted.

4. Reline the duplicated dentures with light-body AvaDent™ Impression Material. The impression material will increase the OVD.

5. Re-assess the OVD; if it needs to be increased, place wax or composite stops onto the occlusal surfaces. If the OVD needs to be decreased, reduce the occlusal surfaces.

6. To confirm aesthetics, verify patient’s midline, incisal edge, gingival height and horizontal plane of occlusion.
7. Mark changes with a permanent marker. For additive changes to incisal edges of the anterior teeth, posterior occlusal plane or flange contours, add wax or composite resin as needed to represent new aesthetics.

8. Verify the centric relation position and record with AvaDent™ Bite Registration material.

9. Make final impressions according to procedures described in the AvaDent™ complete over complete and/or single arch techniques.

10. Disinfect and ship AART and Final Impressions to the lab for fabrication of final AvaDent™ Digital Denture. Also, please include photos of patient smiling and at rest for aesthetic verification.

AvaDent™ Start-up Kit Materials Checklist:

☐ Thermoplastic Trays and Case with Caliper
☐ AvaDent Anatomical Measuring Devices (AMD):
  ☐ (4) Upper Tray with vertical height pin and lip support
  ☐ (4) Vertical height pin extension
  ☐ (4) Lower Single Arch Tray
  ☐ (4) Lower Tracing Tray
☐ AvaDent Putty (Base and Catalyst)
☐ AvaDent Border Molding Material
☐ AvaDent Bite Registration Material
☐ AvaDent Impression Material
☐ AvaDent Adhesive
☐ AvaDent Adjustment Tool
☐ Aesthetic Tooth Guide Transparencies

☐ AvaDent Caliper
☐ AvaDent Bite Plane
☐ AvaDent Prescription Forms
☐ Plastic Case Bags
☐ AvaDent Cup
☐ AvaDent Thermometer
☐ AvaDent Case Shipping Box
☐ AvaDent Start-up Kit Case
☐ AvaDent Clinical Instruction Manuals
☐ AvaDent Clinical Procedure DVD
☐ AvaDent Chair-side Guide
☐ AvaDent Patient Marketing Materials CD
☐ AvaDent Counter Card and Holder
## AvaDent™ Product List

<table>
<thead>
<tr>
<th>Product Description</th>
<th>Upper</th>
<th>Lower</th>
<th>Sizes</th>
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<tr>
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<tr>
<td>AvaDent Bone Reduction Guide</td>
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<td>✓</td>
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<tr>
<td>AvaDent Immediate Temporary</td>
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<tr>
<td>AvaDent Single Arch</td>
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<td>✓</td>
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<td>AvaDent Verification Template Clear</td>
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<td>Small, Medium, Large</td>
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<td>Replenishment Kit - B</td>
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<td>Small, Medium, Large</td>
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<td>AvaDent Impression Material</td>
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<td>AvaDent Border Molding Material</td>
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<td>Green Dispenser Tips</td>
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<td>Dispenser Guns w/Slide</td>
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<td>Aesthetic Tooth Guide Transparencies</td>
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<td>AvaDent Adhesive</td>
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<td>AvaDent AMD Assembly</td>
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<td>✓</td>
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<tr>
<td>Pre-Milled Implant Locator Pockets</td>
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**AvaDent™ Provider Training Options**

**Train Online.**

You can start right now and learn at your own pace with free online clinical training videos. Please contact GDS Europe.

**Live Webinars.**

Join Global Dental Science for free, regularly scheduled, live training webinars where you can walk through the clinical process step by step. These are small group classes and you will be able to see the process and ask questions. Please contact GDS Europe.

**Events and Seminars.**

Check out our schedule of events and seminars. Visit our website or call for information GDS Europe.

For further information go online to: [www.avadent.nl](http://www.avadent.nl)
Marketing Materials

To help you communicate the advantages of AvaDent Dentures to your current and future patients we have created marketing materials that you are free to use to promote your practice. All materials can be customized to include your practice logo and information. A CD containing all of the following items is included with the AvaDent Start-up Kit.

Materials Included:

• **Team Talking Points**

• **Practice letters introducing AvaDent**
  1. Existing Patients
  2. Prospective Patients

• **Public Relations Press Releases**
  1. Feature
  2. Lifestyle
  3. Business
  4. (PR tutorial)

• **Newspaper / Magazine ads**
  1. Her Smile
  2. Two Appointments
  3. Two Appointments V2
  4. I just smile
  5. Not Grandmothers Denture
  6. Virtually You
  7. Virtually You V2
  8. Her Smile V2
  9. I Want AvaDent

• **Patient Brochure**
  1. Breakthrough Technology
  2. I Want AvaDent

• **Counter Card**
  1. Virtually you
  2. I Want AvaDent
  3. Two Appointments
Tests Summary:

AvaDent Bonding Procedure Results:
  • The AvaDent bond exceeds ADA requirements.

AvaDent Color Stability Results:
  • AvaDent is more color stable than conventional dentures.

AvaDent Acrylic Porosity Results:
  • AvaDent shows no micro-porosity resulting in negligible C. Albicans adherence.

AvaDent Residual Monomer Results:
  • AvaDent has 20% less residual monomer than conventionally fabricated dentures.
Evaluation of the Properties of AvaDent Processed Denture Material

1. Purpose
The main goal of this study was to evaluate the physical properties of an AvaDent processed denture material and to compare them to traditional processed denture materials.

2. Methods and Materials

When applicable, the following tests have been designed according to ISO and ANSI/ADA standards. Some of these methods have been modified to accommodate the new CAD-CAM denture tests.
- ISO 20795-1 Dentistry – Base polymers – Part 1: Denture base polymers
- ISO 22112 Dentistry – Artificial teeth for dental prostheses
- ANSI/ADA Specification No. 12 – Denture Base Polymers
- ANSI/ADA Specification No. 15 – Synthetic Resin Teeth

For this test the denture material processed by AvaDent is Diamond D from Keystone. The conventional materials used in this test are Diamond D by Keystone and Lucitone 199 by Dentsply.

4 different brands of synthetic resin teeth are used:
- BlueLine (Ivoclar-Vivadent)
- Portrait (Dentsply)
- Ivostar (Ivoclar-Vivadent)
- Classic (Dentsply)

2.1 Screening and selection of adhesive and bonding procedure.

2.1.1 Selection of adhesive

In order to select a suitable adhesive to bond the artificial teeth to the AvaDent processed denture base, a screening test has been performed. 6 different adhesives are tested using a dog-bone sample in a tensile test. The dogbone sample (see picture) is made of two pieces AvaDent processed denture material ‘a’ and ‘c’ bonded together with an adhesive ‘b’

2.1.2 Bonding procedure

The selected adhesive of the tensile test is used in this bonding procedure test. 12 samples per bonding procedure per brand of synthetic resin teeth:
4 bonding procedures are tested:
A= No surface preparation
B= Channel Cut preparation (physical retention)
C= Chemical etch preparation
D= Physical surface etch preparation
For each brand of denture teeth, two groups of 6 teeth are bonded with each of the different bonding procedures to standard acrylic blocks designed and milled in order to reproduce the same testing conditions described below (2.2). The samples are stored at 37°C and 100% r.h. Twenty four hours after bonding, the specimens has been tested. Each tooth is loaded on a universal testing machine at 5 mm/min using a loading apparatus as illustrated in Figure 1.

A sample matrix for this test is provided in Table 1.

### Table 1: Number of specimens for each bonding procedure/Artificial teeth combination to be tested.

<table>
<thead>
<tr>
<th>Bonding procedure A</th>
<th>Bonding procedure B</th>
<th>Bonding procedure C</th>
<th>Bonding procedure D</th>
</tr>
</thead>
<tbody>
<tr>
<td>BlueLine</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Portrait</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Ivostar</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Classic</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
</tbody>
</table>

The bond passes the test if the fracture path is cohesive within the tooth or the base polymer. Thus, tooth remnants shall remain bonded to the denture base polymer and/or denture base polymer shall remain on the tooth surface. If the fracture is along the bonded area or at the interface, it fails to meet the requirement.

The test is deemed passed if at least 10 out of 12 teeth pass the test. If only eight or nine comply, the test has been repeated with a new set of 6 teeth. If less than eight specimens comply, the denture base polymer/teeth/bonding system combination fails.

The values of force required to debond the specimens has been recorded in order to perform quantitative comparisons among the tested materials.

**Results:**

**Bonding**

The bonding test results along with the pass/fail result for each tested group are shown in Table 2. All the groups passed the standard criteria.

### Table 2: Results of the bonding test. *N/A: samples not broken due to load cell overload.*

<table>
<thead>
<tr>
<th>Group Name</th>
<th>N</th>
<th>Mean</th>
<th>Std Dev</th>
<th>N/A*</th>
<th>Adhesive fracture</th>
<th>Cohesive fracture (tooth)</th>
<th>Cohesive fracture acrylic</th>
<th>Pass/Fail</th>
</tr>
</thead>
<tbody>
<tr>
<td>A/Classic</td>
<td>12</td>
<td>364.7</td>
<td>162.0</td>
<td>0</td>
<td>0</td>
<td>11</td>
<td>1</td>
<td>Passed</td>
</tr>
<tr>
<td>A/Ivostar</td>
<td>12</td>
<td>364.8</td>
<td>145.3</td>
<td>0</td>
<td>0</td>
<td>7</td>
<td>5</td>
<td>Passed</td>
</tr>
<tr>
<td>A/Blueline</td>
<td>12</td>
<td>462.0</td>
<td>157.4</td>
<td>2</td>
<td>0</td>
<td>7</td>
<td>3</td>
<td>Passed</td>
</tr>
<tr>
<td>D/Blueline</td>
<td>12</td>
<td>340.2</td>
<td>128.3</td>
<td>0</td>
<td>0</td>
<td>11</td>
<td>1</td>
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<tr>
<td>D/Classic</td>
<td>12</td>
<td>403.2</td>
<td>105.3</td>
<td>0</td>
<td>0</td>
<td>8</td>
<td>4</td>
<td>Passed</td>
</tr>
<tr>
<td>D/Ivostar</td>
<td>12</td>
<td>467.7</td>
<td>180.4</td>
<td>0</td>
<td>0</td>
<td>8</td>
<td>4</td>
<td>Passed</td>
</tr>
<tr>
<td>D/Portrait</td>
<td>12</td>
<td>368.5</td>
<td>177.5</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>7</td>
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<tr>
<td>B/Classic</td>
<td>12</td>
<td>339.3</td>
<td>141.9</td>
<td>0</td>
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<td>11</td>
<td>1</td>
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</tr>
<tr>
<td>B/Ivostar</td>
<td>12</td>
<td>503.5</td>
<td>151.6</td>
<td>0</td>
<td>0</td>
<td>12</td>
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<tr>
<td>B/Blueline</td>
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<td>517.9</td>
<td>152.1</td>
<td>0</td>
<td>0</td>
<td>12</td>
<td>0</td>
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<tr>
<td>B/Portrait</td>
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<td>293.2</td>
<td>124.8</td>
<td>1</td>
<td>0</td>
<td>8</td>
<td>3</td>
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<tr>
<td>C/Portrait</td>
<td>12</td>
<td>356.5</td>
<td>139.1</td>
<td>0</td>
<td>0</td>
<td>10</td>
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<tr>
<td>C/Blueline</td>
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<td>187.6</td>
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<td>10</td>
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<td>C/Ivostar</td>
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<td>457.6</td>
<td>191.6</td>
<td>1</td>
<td>0</td>
<td>11</td>
<td>0</td>
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</tbody>
</table>
Bonding of artificial teeth to conventional denture base acrylic

The quality of bonding to conventional denture base acrylic are evaluated using the same four brands of artificial teeth that were used for the screening of the bonding procedures. Two denture base materials has been used: Lucitone 199 (Dentsply) and Diamond D (Keystone).

For each denture base material and teeth brand two groups of specimens are prepared. The ridge lap of a set of six maxillary anterior teeth per group are grinded. The teeth has been mounted on a metal former using dental mounting wax, as shown in Figure 2, so that about one-half of the lingual surface projects beyond the metal former.

The mounted teeth has been set in dental gypsum using denture flask. The metal former has been removed and the wax has been cleaned with boiling water. After removing all the wax, the denture base polymer has been processed according to manufacturer’s instructions.

Table 3 summarizes the samples that has been tested.

<table>
<thead>
<tr>
<th>Samples for bonding of artificial teeth to conventional denture base acrylic testing.</th>
<th>Lucitone 199</th>
<th>Diamond D</th>
</tr>
</thead>
<tbody>
<tr>
<td>BlueLine</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Portrait</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Ivostar</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Classic</td>
<td>6</td>
<td>6</td>
</tr>
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</table>

The same testing conditions and pass/fail criteria used in the screening of the bonding procedures (2.1.2) has been applied to the samples.

The bonding test results along with the pass/fail result for each tested group are shown in Table 4. All the groups passed the standard criteria.

<table>
<thead>
<tr>
<th>Results of the bonding test. *N/A: samples not broken due to load cell overload.</th>
<th>N</th>
<th>Mean</th>
<th>Std Dev</th>
<th>N/A*</th>
<th>Adhesive fracture</th>
<th>Cohesive fracture (tooth)</th>
<th>Cohesive fracture acrylic</th>
<th>Pass/Fail</th>
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<tr>
<td>Lucitone/Vivodent</td>
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<td>227.0</td>
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<tr>
<td>Diamond D/Classic</td>
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<td>5</td>
<td>1</td>
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<td>3</td>
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<td>6</td>
<td>499.2</td>
<td>131.7</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>Passed</td>
</tr>
</tbody>
</table>
2.2 Color Stability

A group of four disc shaped specimens (50 mm diameter, 5 mm thick) of each material has been made. The specimens has been stored in the oven at 37°C for 24h. Each specimen will then be cut in half. Table 5 specifies the number of samples for this test.

<table>
<thead>
<tr>
<th>Material</th>
<th>Specimen#</th>
<th>Observed more than slight change (Y/N)</th>
<th>$\Delta E$</th>
<th>Pass/Fail</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Observer 1</td>
<td>Observer 2</td>
<td>Observer 3</td>
<td></td>
</tr>
<tr>
<td>AvaDent</td>
<td>1</td>
<td>N</td>
<td>N</td>
<td>0.79</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>N</td>
<td>N</td>
<td>0.91</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>N</td>
<td>N</td>
<td>0.90</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>N</td>
<td>N</td>
<td>0.86</td>
</tr>
<tr>
<td>Lucitone 199</td>
<td>1</td>
<td>N</td>
<td>N</td>
<td>1.29</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>N</td>
<td>N</td>
<td>1.47</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>N</td>
<td>N</td>
<td>1.18</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>N</td>
<td>N</td>
<td>5.54</td>
</tr>
<tr>
<td>Diamond D</td>
<td>1</td>
<td>N</td>
<td>N</td>
<td>1.11</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>N</td>
<td>N</td>
<td>2.40</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>N</td>
<td>N</td>
<td>3.35</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>N</td>
<td>N</td>
<td>0.43</td>
</tr>
</tbody>
</table>

One of the half’s from each specimen has been covered with aluminum foil. The specimen has been transferred to a test chamber containing a light source so that the specimen has been immersed in water at 37°C while irradiated for 24h. For the irradiation light source, a RS275 watt sunlamp or equivalent has been used. The light has been adjusted as to provide approximately 1700 mw/cm2 and the specimens has been irradiated for 24 hours.

The color difference between the specimens and between the two sides of the irradiated specimen has been evaluated by three independent observers and quantified as $\Delta E$ using a chromameter. The test is deemed passed is $\Delta E$ is below 3.3 (the minimum color difference detectable by the naked eye).

The color stability results along with the Pass/Fail criteria for each specimen are summarized in Table 6.

All the AvaDent Processed denture base specimens passed the test. Only one specimen of Lucitone 199 and one specimen of Diamond D failed to meet the established criteria ($\Delta E < 3.3$). Note that the criterion is more restrictive than the ISO standard and that all the specimens did comply with the standard according to the assessment by 3 independent observers. It is usually considered that the human eye cannot detect a color difference of less than 3.3 using the CIE color measuring system.

2.3 Freedom from porosity

The milled AvaDent denture acrylic, Lucitone 199 and Diamond D has been tested. A group of six specimen strips of each material has been prepared. Each strip has been 64mm long, 10mm wide and 3.3mm in height. In order to pass the test, at least five out of the six strips shall be completely free of porosity visible to the naked eye. Table 7 indicates the number of specimens to be used for this test.

<table>
<thead>
<tr>
<th>Material</th>
<th>Specimen#</th>
<th>Observed more than slight change (Y/N)</th>
<th>$\Delta E$</th>
<th>Pass/Fail</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Observer 1</td>
<td>Observer 2</td>
<td>Observer 3</td>
<td></td>
</tr>
<tr>
<td>AvaDent</td>
<td>1</td>
<td>N</td>
<td>N</td>
<td>1.11</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>N</td>
<td>N</td>
<td>2.40</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>N</td>
<td>N</td>
<td>3.35</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>N</td>
<td>N</td>
<td>0.43</td>
</tr>
</tbody>
</table>

Table 7 Number of strips (L=64mm, W=10mm, H=3.3mm) to be used for the freedom of porosity test.
If no differences on porosity are observed among the materials, optical microscope at 10 and 40X has been used to assess the presence of porous on the surface. If no differences are observed three specimens of each material has been evaluated using AFM.

Results for the specimens that were free of porosity are shown on Table 8.

Table 8 Porosity observations results

<table>
<thead>
<tr>
<th>Material</th>
<th>Observer #1</th>
<th>Observer #2</th>
<th>Pass/Fail</th>
<th>40X microscope</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAD/CAM</td>
<td>No porosity</td>
<td>No porosity</td>
<td>Pass</td>
<td>No porosity</td>
</tr>
<tr>
<td>Lucitone 199</td>
<td>No porosity</td>
<td>No porosity</td>
<td>Pass</td>
<td>No porosity</td>
</tr>
<tr>
<td>Diamond D</td>
<td>No porosity</td>
<td>No porosity</td>
<td>Pass</td>
<td>No porosity</td>
</tr>
</tbody>
</table>

No porosity was observed by naked eye or under a 40X magnification in any of the specimens.

Contact angle

Table 9 Contact angle values measured for each material. Superscript letters link statistically equivalent groups.

<table>
<thead>
<tr>
<th>Material</th>
<th>Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diamond D</td>
<td>81.3 (11.8)°</td>
</tr>
<tr>
<td>Lucitone</td>
<td>83.8 (9.9)°</td>
</tr>
<tr>
<td>CAD/CAM</td>
<td>96.3 (12.3)°</td>
</tr>
</tbody>
</table>

Significant differences among the contact angle values of the different materials were detected (p=0.025). Avadent Processed material showed the highest contact angle.

2.4 Adherence of C. Albicans

CAD/CAM denture acrylic, Lucitone 199 and Diamond D has been tested. A group of nine specimens of each material has been prepared. Discs measuring 10 mm diameter and 2 mm thick are made. After finishing the surface according to manufacturer’s recommendations, the specimens are stored in water at room temperature for 48h, in order to release any residual monomer. Then, the water contact angle has been measured.

Table 10 Number of disc shaped (D=10mm, T=2mm) to be used for the residual adherence of C. Albicans test.

<table>
<thead>
<tr>
<th>CAD/CAM acrylic</th>
<th>Lucitone 199</th>
<th>Diamond D</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>9</td>
<td>9</td>
</tr>
</tbody>
</table>

The superficial porosity of the specimens has been evaluated microscopically and the number of pores per area unit has been assessed by image analysis.

The specimens has been immersed in human saliva at 37°C for 30 min in order to condition the surface. Then, the samples has been incubated for 1h in a standardized C Albicans suspension at 37°C. After this time, the specimens has been washed in sterile PBS by gently dipping them 10 times in the solution. The adherent cells that remain on the sample surface after this period has been evaluated using microscopic techniques to determine the number of cells per area unit. If the AvaDent processed denture material did not increase the bacterial adhesion significantly when compared to the other two materials, the test has been deemed passed.
Data entry, tabulation and analysis

The measured parameters have been tabulated and analyzed using ANOVA in order to determine if significant differences exist among the tested processing methods. Correlation tests have been performed in order to determine whether a relationship exists between the different studied parameters. All statistical analysis are performed at 95% confidence level.

Bacterial adhesion

Figure 11 summarizes the results of the bacterial adhesion test.

ANOVA revealed significant differences among the denture materials (p=0.007). The AvaDent processed material was found to adhere less Cryptococcus Albicans than Diamond D (p=0.005).

The AvaDent processed material is more hydrophobic than the conventional processed material what will result in a more bio-hygienic denture.

2.5 Residual methyl methacrylate monomer

AvaDent Processed denture acrylic, Lucitone 199 and Diamond D have been tested. For each material, a group of 3 discs 50mm diameter and 3 mm thick was prepared. The discs will be kept in the dark in a laboratory environment for 24h. Then, the specimens were grinded sequentially on wet P500 and P1200 SiC paper. Both sides of the specimens were grinded until a thickness of 2 mm was obtained. The periphery of the specimen was then be grinded against the P1200 SiC paper until the entire periphery was abraded and smooth.

The ground specimens were stored in the dark in a laboratory environment for 24h. The MMA monomer was extracted with a 2% hydroquinone solution in acetone. The dissolved polymer was precipitated using a 2% hydroquinone solution in methanol and separated by centrifugation. The residual monomer content was be determined by GC using n-pentanol as internal standard. The test is deemed passed if the residual methyl methacrylate is below 2.2% mass fraction.

The residual methyl methacrylate content results along with the Pass/Fail criteria for each specimen are summarized in Table 11.

All the AvaDent processed denture base specimens passed the test. Only one specimen of Diamond D and one specimen of Diamond D failed to meet the established criteria (content of residual methyl methacrylate monomer below 2.2%).

Note that the ISO standard only requires that 7 of the specimens comply with the requirement, so all the materials passed the standard test. No significant differences among the materials were detected for the average methyl methacrylate monomer content (p=0.11).

<table>
<thead>
<tr>
<th>Material</th>
<th>Specimen#</th>
<th>MMA% w/w</th>
<th>Pass/Fail</th>
</tr>
</thead>
<tbody>
<tr>
<td>AvaDent</td>
<td>1</td>
<td>0.31%</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>0.34%</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>0.31%</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>0.71%</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>0.38%</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>0.38%</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>0.65%</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>0.62%</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>0.51%</td>
<td>Pass</td>
</tr>
<tr>
<td>Diamond D</td>
<td>1</td>
<td>0.68%</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>0.46%</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>0.97%</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>0.71%</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>0.52%</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>7.39%</td>
<td>Fail</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>0.58%</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>0.47%</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>0.86%</td>
<td>Pass</td>
</tr>
<tr>
<td>Lucitone 199</td>
<td>1</td>
<td>0.91%</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>0.35%</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>0.55%</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>0.78%</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>0.81%</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>0.42%</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>0.46%</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>0.52%</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>0.51%</td>
<td>Pass</td>
</tr>
</tbody>
</table>

Table 11 Results of the residual methyl methacrylate (MMA) monomer test
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