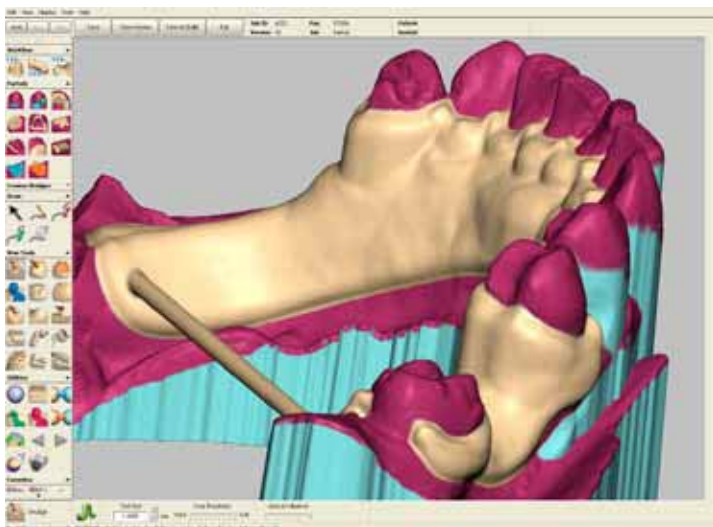
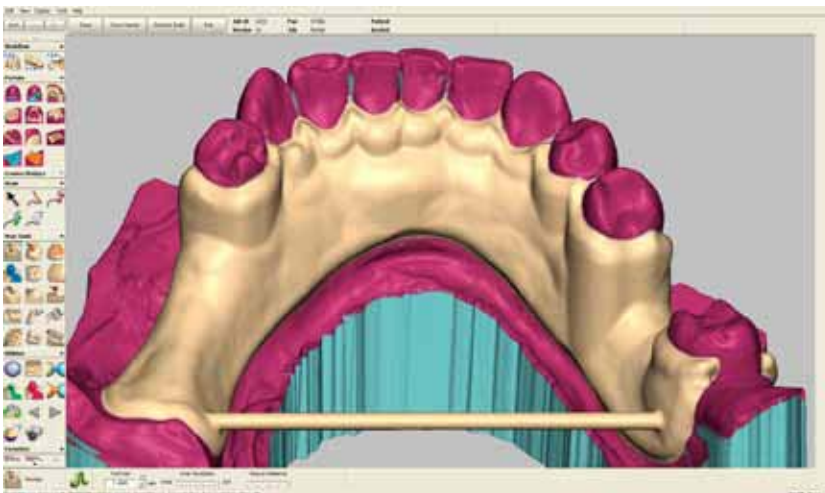


All-Digital Flexible Partial: Saving Time, Materials and Money

By Ron Philbrook, CDT, and Matt Tait, RDT

Figures 1 & 2
Completed digital designs created using the SensAble Dental Lab System.



Flexible partials are growing in popularity as patients get more involved in their dental care and selecting their restoration options. Patients prefer the esthetics of a virtually invisible partial, as well as the comfort of a nonmetal material.

Unfortunately, producing flexible partials using traditional lost-wax methods has always been a finicky and time-consuming endeavor, which has meant low margins and more production hassles for dental laboratories. The thermoplastic nylon material used for flexible partials is highly technique-sensitive. Designs require an extremely precise, uniform thickness for the finished restoration to provide the proper retention and achieve the perfect fit essential for effective treatment of the patient's underlying condition. Final polishing time has to be tightly controlled, as too much polishing will thin the partial too much and damage its structural integrity. Because once the partial is made, the laboratory technician can only make a few alterations, the fit has to be right the first time or the laboratory must remake it. That means extra material expense as well as additional staff time.

Recent advances in digital design and production systems are addressing the core challenge of this

restoration type — achieving a precise, consistent thickness. Laboratory technicians who formerly considered flexible partials as their least favorite restoration type to manufacture, are now saving time, materials and money in the production of flexible partials. This change occurred largely because digital systems are using the computer to its utmost precision. This technology opens the doors for many more laboratory owners who may want to take advantage of the up tick in patient interest in this restoration type.

In this case, a female patient in her 60s presented with functional and esthetic needs that could not be met with a cast partial. The patient had previously been prescribed with rigid partials, but was unhappy with the metal clasping. The severe undercuts present on the teeth made the path of insertion particularly difficult. As a result, there were many areas that had to be blocked out resulting in some gaps between the prosthesis and the natural teeth, which caused food-trap areas and tongue irritants. After numerous adjustments and a couple of consultations, the doctor prescribed a flexible partial.

In the past, technicians at BonaDent Dental Laboratory, with locations in West Melbourne and Seneca Falls, N.Y., would have spent approximately one hour to design, fabricate, trim, grind and polish a flexible partial by hand so that the thicknesses were just right. Using the SensAble™ Dental Lab System, an all-digital design process, total technician time was reduced to 35 minutes — an overall time savings of about 60 percent. Because flexible partials comprise about 20 percent of the laboratory's overall partials business, this time savings is significant.

The digital design followed this streamlined process.

1. Trim the Scan: To start the flexible partial design process, SensAble's optimized scanning software created an accurate 3D model. To select the areas of the scan required to design the partial denture, the technician used the system's unique 3D Virtual Touch stylus. The stylus literally let the technician feel the surface of the model, this allowed the technician to quickly paint the areas he wanted to use. Then, at the press of a button, the system removed any unnecessary portions of the scan. Working with only the areas of the scan that are needed, saved the technician's time.



Figures 3 & 4
*Cleaned resin patterns
ready for set up.*



- 2. Survey and Block Out Undercuts:** Like in hand waxing, the technician surveyed and blocked out the undercuts. However, with SensAble, this process took less than a minute. The depth of undercuts was displayed in different colors and was balanced by modifying the path of insertion. The system provided pop-up views so the technician could see the model from all angles simultaneously. When ready, the technician pressed a button and the system automatically applied digital block-out. Then, using the 3D Virtual Touch stylus, he carved the block-out away to expose the undercuts for clasp retention. SensAble's survey was so accurate that there was no need to trim under the clasps later.
- 3. Block-out and Add Relief:** For block out, it was easy for the technician to accurately increase the draft angle at specific locations in the flexible partial design. The technician set the precise draft angle at which he wanted to apply digital block-out, then painted the areas where he wanted it applied. The system



Figures 5 – 10
Resin patterns with set up.



automatically added it. The technician used the 3D Virtual Touch stylus to smooth the digital block-out, just as if he was working with an alcohol torch. If relief needs to be added to places such as extraction sites and rugae and free gingival areas, SensAble's virtual wax-up tools make it fast and easy to do.

4. **Design the Partial and Add the Base Plate:** Using the 3D Virtual Touch stylus, the technician drew the flexible partial design's outline on the digital model. Then he entered the desired digital wax thickness and falloff distance. The system automatically created the base plate to his specifications with a rounded exterior edge – eliminating the need to trim the base plate later. The technician smoothed the entire base plate with just one click. Once the technician designed the

base plate, he reduced down saddle areas to provide the required support and strength for denture teeth. The SensAble system eliminated the risk of over flaming the wax during set up, preventing the clasps from thinning down and the associated remake. By working digitally, the technician designed a base plate of precise uniform thickness. This provided a much more consistent and predictable result that addressed the doctor's and patient's request for the partial to avoid becoming bulky.

5. **Fabrication:** The digital design was printed in resin on a 3D printer. The technician positioned denture teeth on the resin pattern and proceeded to flask it to create a mold. With SensAble, he was free to work with almost any material that's on the market. In




Figures 11- 15
Finished flexible partial.



addition the company provided a helpful best practices guide about the recommended procedures for investing, pressing, casting and finishing, specific to each material. After removing the resin pattern from the mold, the flexible partial material was injected. The finished restoration was uniform in thickness and fit so well that trimming was virtually eliminated. Grinding and polishing time was reduced by more than 50 percent.

BonaDent's team found the SensAble system allowed far more precise control over the final design of the clasps and, most importantly, the thickness of the final restoration. Along with saving about 60 percent of the time it formerly took to produce the flexible partial using traditional methods, the overall product was greatly improved as well. Because there were no thick spots to grind out, the overall shape and thickness is exactly how the technician wanted the finished product to be, allowing the laboratory to provide a much more consistent, higher quality restoration.

In addition to the productivity boost, the SensAble system allows technicians of varying levels of experience to design with consistency. Design preferences for the laboratory as well as for each individual doctor can be set in the system, making it easy to produce restorations to exact design specifications.

Additionally, by implementing SensAble's system, BonaDent made it possible for their technicians to produce more restorations per hour — enabling each technician to increase their earnings — and at the same time, helping the laboratory to produce more patient cases in the same amount of time without sacrificing quality. This has been a major factor in expanding BonaDent's flexible partials business by about 10 percent annually during the past few years. 

About the Authors:

Ron Philbrook, CDT, is cast partials manager at BonaDent Dental Laboratories. He has more than 15 years of wide-ranging experience in the development of removables using industry-leading systems, and trained with renowned technicians and clinicians including John Kois, Vinnie Aleluah and Derric DesMarteau. He holds a degree in the history of science, medicine, and technology from the University of Florida.



Matt Tait, RDT, is a dental applications engineer at SensAble Technologies, Inc., maker of the SensAble™ Dental Lab System. He has more than 35 years experience in dental technology and has been an R.D.T. since 1985. Prior to joining SensAble, he was the general manager of a 20-person laboratory specializing in partial frameworks, an owner/partner of a high-end laboratory in England and a senior technician in a laboratory that produced more than 100 frames per day. Tait holds a Bachelor of Science degree in applied technology.



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By: Ron Philbrook, CDT, and Matt Tait, RDT
(NBC Approval #:21660 , FDIA Approval #: 20-291055)

1. The thermoplastic nylon material used for flexible partials is highly technique-sensitive.
 - a. True
 - b. False
2. What are the advantages of using a digital design to create a flexible partial?
3. What is the percentage of overall time savings with all digital design and fabrication over the lost wax technique?
 - a. 30%
 - b. 50%
 - c. 60%
 - d. 80%
4. What is the first step in the digital design process of a flexible partial using SensAble's Dental Lab System?
 - a. Fabrication
 - b. Block out undercuts
 - c. Add the base plate
 - d. Trim the scan
5. Using the SensAble system approximately how long should it take a technician to survey and blockout the undercuts?
 - a. Less than 1 minute
 - b. 3 minutes
 - c. 5 minutes
 - d. 10 minutes
6. What step comes after the block-out and adding the relief?
7. What step is eliminated using the SensAble system during the creation of the base plate?
 - a. Entering the desired wax thickness
 - b. Trimming the base plate later
 - c. Pressing
 - d. Casting and finishing
8. One fault of the SensAble system is that it increases the risk of over flaming the wax during set up.
 - a. True
 - b. False
9. During fabrication technicians may use any material on the market in conjunction with the SensAble system.
 - a. True
 - b. False
10. Grinding and polishing time was reduced by how much in this case?
 - a. 10%
 - b. 30%
 - c. 50%
 - d. 60%

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