Designing multiple restoration types using one dental CAD/CAM system

By John Aitchison, CDT, Minot Dental Laboratory and Bob Steingart, SensAble Dental Products

To date, dental CAD/CAM systems have primarily focused on creating only one specific type of fixed restoration — zirconia copings. As the digital evolution in the dental industry continues, innovative software combined with tightly integrated hardware, as well as new materials and fabrication techniques, are making it possible for dental labs to purchase one system and use it to create multiple types of restorations.

For example, newer systems allow the digital design of removable restorations — metal and flexible partials — along with full contour crowns and bridges. With Baby Boomers and the current economic conditions fueling demand for removable prosthetics, along with the ability to design removable prosthetics digitally instead of painstakingly by hand, many labs that may have outsourced partials in recent years now view investing in CAD/CAM to produce them in-house as a viable way to grow their businesses.

Our lab has been using the SensAble Dental Lab system since late 2008. We have completed almost 14,000 restorations with it — including both partials and crown and bridge work — and the time savings is tremendous.

We can digitally design and wax a three-unit bridge in less than 10 minutes, compared to hand waxing, which used to take us 90 minutes. We can complete a press over metal (PoM) crown in less than four minutes.

We start with a tooth from one of the fully integrated digital tooth libraries; design the crown; and then simply press a button to create the anatomical coping. One technician digitally designed a porcelain fused metal (PFM) coping in literally 45 seconds. We are also seeing incredible efficiencies when digitally designing partials.

The system gives us the creative freedom to tackle even the most challenging cases. We don’t have to make any special changes to our system to accommodate partials, compared to crown and bridge work.

Two of our most recent cases illustrate the system’s flexibility and the time-savings we are able to achieve — time that frees us to do other cases — as well as the added.

Fig. 1a
(Photo/Provided by SensAble Dental Products)

Fig. 1b
(Photo/Provided by SensAble Dental Products)
An introduction to the Lab Tribune

Dear fellow dental professional,
Welcome to the inaugural issue of Lab Tribune!
Both dentists and laboratory technicians alike can agree that a commitment to invest in developing an excellent working relationship is time well spent.
As dental professionals, we need to recognize the important contribution we make together for the patients we serve and continue to expand our knowledge and develop our skills to excel in the dental profession.
With that in mind, we have launched Lab Tribune as a monthly insert for our Dental Tribune biweekly.

Our purpose is to bring to our readers — both technicians and dentists — information on topics that are of utmost importance toward fostering an excellent working relationship between the laboratory team and the dentists they work with.
In addition, we would also like to create an open forum that presents the current discussions on new technologies, challenges we face, and solutions to everyday situations we encounter.
We look forward to hearing any suggestions you might have for article topics, as well as hearing any general feedback you would like to share with us.
Please do not hesitate to contact me at laura@lkdentalstudio.com.

Sincerely,
Laura Kelly
Accredited Technician, AADC

Sirona also enlisted an impressive who’s-who list of dental industry speakers for the seminars, including:
- Eddie Corrales
- Russell Giordano, DMD, DMSc, FADM
- Greg Harris, vice president, Novadent Group
- Imtiaz Manji, CEO, Scottsdale Center for Dentistry
- William R. Mrazek, BS, CDT
- Matt Roberts, CDT, AADC
- Mike Skramstad, DDS

For more information on all current discussions on new technologies, challenges we face, and solutions to everyday situations we encounter.
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precision that comes from working digitally.

Partial case
In the first case (Figs. 1a, 1b), the patient had only six of his natural teeth remaining on his lower arch, and was about to lose two more—the first bicuspids on each side (#21 and #28). These two teeth were helping to retain the patient’s current restoration in place.

SensAble’s system made it fast and straightforward to design a new removable restoration specifically to meet the challenges of this case.

Our technician designed a partial with four I-bar clasps that contact the four remaining teeth to provide ample retention, while still being positioned low enough as to not show when the patient smiles.

Additionally, we added lingual plates for the required bracing on all four teeth. These lingual plates will also be incorporated into each bridge design that the patient will need in the future.

Built in time-saving features such as digital survey and block out; presets for clasps, mesh designs and lingual bars; a digital waxing tool that allows us to precisely set wax thickness; and a special tool that rapidly creates sprues on the digital model, enable us to complete our digital designs in record time.

On this case, we surveyed and blocked out in less than one minute and digitally designed the partial in less than 20 minutes—compared to 45 minutes to 1 hour using traditional methods.

We also saved more time, and reduced costs, because we didn’t have to create or wait for a refractory model before we could get started or purchase the refractory material. When you hand wax a partial, there’s plenty of opportunity for human error, but with the SensAble system, the accuracy is superb! Once the digital design is complete, the system prints a resin pattern, which is then invested and cast using traditional methods and materials. The metal frameworks are so accurate that we literally take them out of the casting oven and sandblast them, and they’re ready to polish.

We save time and completely eliminate the possible errors associated with using grinding wheels and stones to finish the metal partials. Additionally, because we have a digital file of this partial, we can easily modify this design to accommodate future needs.
moderate any future loss of dentition that this patient may have. If we were hand-waxing this partial, we would basically have to start anew.

With the SensAble system, our technician can simply recall the original design and change it as needed, without requiring the patient to return to the dentist — making it easier for the patient and freeing up the dentist to see other patients. Having digital files of our designs also saves us time in the case of a miscast.

**Full-contour crown case**

One of our other cases (Fig. 2) involved a patient who completely sheared off the top of a molar, and required a crown to restore the tooth.

In this case, we felt an all-ceramic pressed restoration (monolithic) would provide a better solution than a porcelain-fused-to-metal (PFM) crown because the high tensile strength of a ceramic pressable restoration could withstand the constant pressure of chewing, required of a molar.

Also, an all-ceramic crown would be more esthetically pleasing — all-white as opposed to white with an unappealing, thin, black metal line where the crown and gum tissue meet.

In this case, the dentist prepared the top of the patient’s remaining tooth.

Using one of the integrated tooth libraries in the SensAble system, the technician designed a full-contour crown (Fig. 2), literally in two minutes — a crown that anatomically matches the patient’s other teeth and fits perfectly.

Next, the digital design was printed in resin, which was used to create an investment mold. Then, in one final step, the heated ceramic ingot was pressed into the pre-heated mold to produce the final pearly, luminous restoration.

**Conclusion**

In today’s economy, labs are seeking more ways to work smarter as well as more efficiently to produce precise, high-quality restorations. New, highly versatile dental CAD/CAM systems that deliver multiple types of restorations, along with consistent results, regardless of which technician does the work, give labs a greater return on their technology investment.

Labs that purchase with an eye toward maximizing the use of their CAD/CAM systems will ultimately win out as our industry continues to transition to a digital future.

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**About the authors**

**John Aitchison**, CDT, owner of Minot Dental Laboratory, has more than 35 years of experience in the dental lab industry. Minot Dental Laboratory is one of the oldest continually operating full-service dental labs in the United States, founded in 1906, with more than 20 staffs and a commitment to quality and innovation.

**Bob Steingart**, president of SensAble Dental Products, has more than 25 years experience in successfully transforming innovative technologies into commercial solutions. He has held executive positions in business development, product management and marketing at Avid Technologies, EMC, Lotus Development, Sitara Networks and Kurzweil Applied Intelligence. Steingart holds an MBA from Harvard Business School and BSEE and MSEE from MIT.