

# Digital cosmetic imaging: Tips and tools to keep you and your patients smiling



By Dr. LARRY EMMOTT

Seeing is believing: that's what makes the latest digital technology for cosmetic imaging so exciting. Showing a patient what we have in mind when we propose cosmetic treatment is key to his or her committing to the program.

Previously, cosmetic imaging was difficult to do, time-consuming, and expensive. That has changed, though, thanks to innovative image-management programs, which include cosmetic-manipulation tools and digital-smile libraries, along with digital cameras and high-end printers. Today, the cosmetic-imaging process is easier, faster, and less costly.

This guide to cosmetic imaging takes a look at some high-tech digital tools, from software to smile libraries to cameras, and presents photo-taking tips to help your cosmetic imaging efforts pay off for you and your patients.



By Dr. Larry Emmott

**W**hen two people communicate, only 7% of what we understand comes from the words we say. Of the rest, 38% comes from inflection or the way we say it, and well over half, 55%, is visual. These amazing numbers come from 30 years of research by Albert Mehrabian, PhD, at UCLA. At first, this seems counterintuitive. We believe our words are so important. However, if you really examine how we communicate, Mehrabian is right. That's why intraoral video cameras, digital images, and cosmetic imaging are such powerful tools.

Cosmetic imaging was introduced to dentistry in the mid-1980s. After a brief flurry of excitement, it faded away. It was hard to do, took too much time, and was expensive. This has changed. Like most technology-driven items, cosmetic imaging has become easier, better, and much less expensive. The change is the result of better software with specific tools designed for dental use, good digital cameras and other inexpensive capture systems, quality photo printers, and the growing use of computers in all areas of the dental office. A wide range of these tools are available for dental practices; the few mentioned in this article are those with which I am familiar.

## Cosmetic imaging

Innovative, imaging-software programs have been driving the cosmetic-imaging revolution. The programs combine several image-management features, including image capture, storage, retrieval, editing, printing, and manipulation or enhancement. Advanced features include video, radiograph integration, and electronic-image transmission.

The basic cosmetic imaging process works this way. First, an image or digital-smile picture is created. This image can be taken with a digital camera, captured from a video image, or scanned from a conventional hard-copy photograph. Once captured, the image is stored in an electronic photo album. The album will have

a search function to locate each patient's photos. The function usually allows a user to search quickly for names in an alphabetical database and photos in a database of thumbnail images.

The next step is to alter the image with cosmetic-manipulation tools to simulate treatment results. These tools are what set imaging software apart from basic image management. Plus, new imaging programs have better tools that are easier to use than those in most of the original systems. The tools are common photo-manipulation tools, such as those used in Adobe Photoshop,

but they are customized for easy dental applications.

For example, there are tools for whitening demos as well as tools to move, rotate, reshape, or replace teeth.

There are two basic ways to make cosmetic-image changes. One is to reshape individual teeth. The other is to use a digital smile library to replace several teeth or a set of teeth.

## Reshaping/whitening

Reshaping individual teeth works well for simple changes, such as closing a diastema or lengthening individual teeth. For example, to close a diastema, first choose the mesial half of one central. Do this by clicking and drawing around the tooth. This can be done with a mouse; however, if you are really into this, graphics tablets are even better. A graphics tablet is an electronic pen and tablet that allows users to actually draw on the computer screen by drawing on the tablet. It is the tool of choice for computer graphics artists. Most dentists, though, will do well with a mouse. I have tried both and ended up using the mouse.

Once you have outlined the area you want to enhance, you can use several tools to change it. The actions these tools perform include moving, inverting or flipping teeth as well as stretching or compressing teeth.

For a diastema, you will stretch the mesial edge to fill about half the space. Then, choose the mesial half of the other central, and stretch it over to meet the mesial of the first central. Once you know how to use the tools, this process will take less than a minute. As an alternative, you could choose the right central, for

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example, and flip it so it now looks like a left central. Then, move it in to the left central position to make a perfectly symmetrical smile.

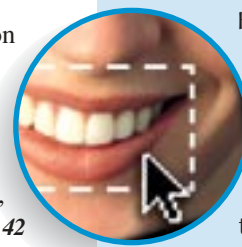
Whitening teeth is similar. First choose the teeth; then, apply the whitening tool. The tool for whitening allows users to

select the degree of change and to add or subtract specific colors. These enhancement tools work well for changing one or two teeth. However, if you are dealing with many ugly teeth, the process will be too time consuming and you are better off using a smile from a digital smile library to simply change the whole smile.

### Digital smile libraries

For complex cases, there are tools on imaging programs that allow you to “replace” any and all teeth with a set of ideal teeth shown in a digital smile library. The library try-in method can be used to replace a single tooth,

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### TAKING COSMETIC PHOTOS

### Staff tips

Here are some tips for your staff to follow when taking cosmetic photos, according to Dr. Emmott:

**1. When you take the patient photo, be sure to have the teeth slightly apart.**

This makes the incisal edges much easier to see, and patients more easily will notice chipped and misaligned teeth. Plus, it is much easier to drop in a smile from a smile library if the lower teeth are out of the way.

**2. Be sure the occlusal plane corresponds to the library images.**

This usually requires that you take the photo at right angles to the occlusal plane. If the photo you take is out of alignment with the library images, when you drop in the library image it looks deformed.

**3. Image either a full face, or a smile close up.**

In theory, a full face is better because patients will recognize it as themselves, and they will see an overall benefit. However, in actual application I have found it difficult to image a full-face photo and make it look natural. I usually image a smile close up.

**4. Provide training for team members.**

Either the doctor or a team member can do the imaging. If you choose to have a team member perform the imaging, there are some areas of concern.

First is that although team members assist the doctor daily in the delivery of treatment, they do not have the same training in dental anatomy and esthetics. They will need to learn what needs to be done to make a smile look better. That will mean some extra training and a longer learning curve.

Even more important, staff will need to know what the doctor is capable of doing. You don't want to show results you are unable to actually achieve given the limits of the case.

**5. Include a disclaimer on all printed images.**

The most significant concern with cosmetic imaging is delivery of the treatment. **You must be able to actually deliver the treatment you are proposing.** Fortunately, in my experience the actual results are usually better than the computer image. Nevertheless, it is a good idea to include a disclaimer on all printed images. For example, the disclaimer could read, “This is a simulation only; actual results will vary.”

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groups of teeth, or the whole arch.

Early on, users were encouraged to make their own digital smile libraries. It is much more difficult than it appears, however, for the following reasons:

- First, your own library must have a variety of really great smiles that show dif-

ferent tooth shapes and arrangements. Few practices will have this many cases available to photograph.

- Then, all of your library smiles should be photographed from the same angle and the same distance, using the same lighting, and with the same teeth showing.
- Other questions arise about creating

your own library, such as: Do you take the picture as a straightforward smile, or with the teeth retracted? Do you show lower teeth or not? How many teeth are important—six, eight, 10?

Making a smile library takes some time and expertise. While you



## TAKING COSMETIC PHOTOS

### Equipment tips

Here are a few things to keep in mind about equipment and other things, such as patient prep, when taking cosmetic photos:

#### Patient prep

- Make sure hair is away from the face.
- Cover collars with a black drape.
- Ask the patient to remove any hat, jewelry, glasses, heavy makeup, or anything else that may interfere with a clear, simple picture.

#### Retractor, mirrors, and contrasters

- Clear, double-ended cheek retractors obstruct light the least.
- Warm intraoral mirrors with water to prevent fogging.
- Contrasters give you a consistent background for close-up shots of the teeth. A contraster is a black material put behind the teeth to create a “blacked-out” background.

#### Film and cameras

- Use high-quality film or a digital camera.
- The better your camera’s optics, the clearer, sharper, and more distortion-free your cosmetic pictures will be.

#### Lighting

- A ring light or ring flash is highly recommended and required for macro shots.
- Your camera’s flash is okay for face shots.
- For more professional-looking face shots, use two studio strobes, one on each camera side.

#### Backdrop

- Use a seamless backdrop (no visible seams).
- Solid blue or gray colors contrast well with skin tones.
- Use a drape or other non-reflective material.

#### Lighting equipment

- Use the same lighting equipment (and camera) every time for consistent quality.

#### Record settings

- Use the same equipment and setting each time, but just in case, record the camera-to-patient distance each time and keep it with your photos.

#### Framing

- When you’re framing top to bottom, do not tilt the camera.
- For oblique (45° degree) and lateral (side) views, have the patient turn his or her entire body (feet and shoulders).

Source: Olympus America’s 2001 brochure, “Photographic standards in dentistry.”

could do it yourself, you might be better off using a prepared library. Here is a list of three digital libraries, all built into imaging software (see page 44 for company contact information):

1. The LVI Smile Library is packaged with Image FX, an image-management program from SciCan. The library shows upper teeth only, is very consistent, and corresponds to LVI's smile-catalog book, *Making You Smile: Before and After Book*.

2. The David Hornbrook, DDS, Smile Design Library was created as a supplement to Vipersoft, a digital imaging program from Integra Medical. The library also integrates with Dentrax Image imaging software from Dentrax.

3. The Lorin Library Digital Smile Design CD from Digident is designed to work with Digident's Digital Dentist, an image-editing program. It also is available as a stand-alone product that can be incorporated into any cosmetic imaging program. The library offers four versions of each of 18 smile designs. The different versions take into account the curve of the arch; some versions include lower teeth. This makes matching the library smile to the patient photo easier and more natural looking. Digident also offers the Lorin Library *Smile Guide*, a full-color book corresponding to the digital images.

The smile-library method has some areas of concern. First, the quality of a library's smiles is critical. Even more critical, though, is the patient picture you take. It must be properly aligned and suitably lighted if the substitute teeth are to look normal. Another key factor is ease of substitution: How easy is it to align the size and position of the try-in teeth with the original smile?

### First-hand experience

One of my first experiences with imaging took place in 1997. It is typical of what will happen when you use cosmetic images to interest your patients in cosmetic work. My patient, an attractive woman with ugly teeth, was a perfect candidate for cosmetic dentistry. Here's what happened the day she came into the office.

First, we took her photo. Then, I did some imaging, while a staff member took x-rays. I showed her the images and explained what we could do. I asked if it were something she would be interested in.

"Yes," she said, and she also asked about some other minor changes. I made those changes, too.

"Can you make them [my teeth] whiter?" she then asked. Well, of course I could. I showed her that change.

"Can I show my husband?" she asked. I printed out a before and after.

"What will it cost?" she asked, and I printed a treatment plan.

In this case, we were proposing some whitening and some direct bonding. It was not a major smile makeover with veneers. Nevertheless, the fee was more than \$1,500. One case, 10 minutes, and it paid for a good portion of my investment.

Since that time, I have had similar experiences with many other patients. Imaging

works for two reasons. First, we know what we have in mind when we propose cosmetic changes. We've seen it before. The patient, though, has no idea what is possible until they are shown corrective images. The second reason cosmetic imaging works is because it is visual. As I said earlier, 55% of communication is visual; 7% is words.

Showing someone what a cosmetic change would look like, rather than just telling him or her about the change, is by far the most powerful way to communicate.

Determining a return on investment for cosmetic imaging is difficult. You cannot control all the variables, and few hard costs associated with it. However, if we

assume that a cosmetic-imaging program will help you gain acceptance for one veneer case every six weeks (in my experience you will do much more), at \$7,000 for each case, that's about \$56,000 a year.

In the five years since my first experience, I have done many cosmetic imag-

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## Technology connections

To learn more about cosmetic imaging software and digital cameras, contact the following companies:

### COSMETIC IMAGING SOFTWARE

Dentrix Dental Systems, a Henry Schein Co.

**DENTRIX IMAGE**  
800-DENTRIX (800-336-8749)  
www.dentrix.com

**Select 58**

Note: Integrates with the David Hornbrook DDS, Smile Design Library

Digident

**DIGITAL DENTIST**  
800-741-7966  
www.digident.com

**Select 59**

Note: Integrates with the Lorin Library Digital Smile Design CD

Eaglesoft, a Patterson Co.

**EAGLESOFT**  
800-294-8504  
www.eaglesoft.net

**Select 60**

Integra Medical, a Henry Schein Co.

**VIPERSOFT**  
877-VIPER GO (877-847-3746)  
www.vipersoft.com

**Select 61**

Note: Integrates with Hornbrook Smile Library

MultiMedia Dental Systems

**MEDIADENT IMAGING SOFTWARE**  
877-770-8514  
www.multimediental.org

**Select 62**

PracticeWorks

**PRACTICEWORKS/DICOM IMAGING**  
800-944-6365  
www.practiceworks.com

**Select 63**

SciCan

**IMAGE FX**  
800-572-1211  
www.scican.com

**Select 64**

Note: Integrates with the LVI Smile Library

Smart Technology

**DAVID HORNBOOK DDS,  
SMILE DESIGN LIBRARY**  
800-695-3917

**Select 65**

www.smart-technology.net/main.htm

### DIGITAL CAMERA KITS

CliniPix

**CLINIPIX / FUJI S1 PACKAGE**  
866-254-6749

**Select 66**

Note: The kit comes with a Fuji S1 Pro camera (6.1 megapixels)

Eastman Kodak Co.

**DENTAL DIGITAL PHOTOGRAPHY KIT 290**  
800-933-8031  
www.Kodak.com/go/dental

**Select 67**

Note: The kit comes with a Kodak DC290 camera (2.3 megapixels)

Lester A. Dine Corp.

**DINE DIGITAL SOLUTION PACKAGE**  
800-624-9103  
www.dinecorp.com

**Select 68**

Note: The kit comes with a modified Olympus C-4040 camera (4.1 megapixels)

PhotoMed International

**PHOTOMED C-4040 DIGITAL CLINICAL CAMERA SYSTEM**  
800-998-7765  
www.photomed.net

**Select 69**

Note: The PhotoMed kit comes with an Olympus C-4040 camera (4.1 megapixels)

PracticeWorks/DICOM Imaging

**OLYMPUS HEALTHCARE KIT WITH P 400 DYE SUBLIMATION PRINTER**  
800-944-6365  
www.practiceworks.com

**Select 70**

Note: The kit comes with an Olympus C-2500L camera (2.5 megapixels)

SciCan

**PHOTOMED EPSON 3100Z DIGITAL CLINICAL CAMERA SYSTEM**  
800-572-1211  
www.scican.com

**Select 71**

Note: The kit comes with an Epson 3100Z camera (3.3 megapixels) and SciCan's Image FX imaging software

Source : Dr. Larry Emmott, Dental Products Report



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ing cases. For my suggestions for those practicing cosmetic imaging or thinking about it, see "Taking cosmetic photos: Staff tips" on page 40.

### Taking pictures: standards

The best method for taking pictures for cosmetic imaging is to use a digital still camera. To help dentists get the most out of digital photos, Olympus America, working with Drs. David Gane and Mike Maroon, has developed a set of standards for dental imaging and digital photography. Some of these standards are highlighted in Olympus' six-page 2001 brochure, "Photographic standards in dentistry." The brochure includes information on camera-magnification ratios and on camera and patient positions for different images. The brochure also includes tips on lighting and backdrops (see "Taking cosmetic photos: equipment tips" on page 42). The Olympus standards are a great place to start your experience taking digital images of patients. The standards are available on the Web site: [www.olympusamerica.com](http://www.olympusamerica.com). Click on "Business Solutions," then "Healthcare," then "Dentistry."

### Choosing a camera

Here's what to look for when buying a digital camera for dental cosmetic imaging:

#### Macro focus

The camera must be able to take a good picture, in focus, and without distortion of both a full face and a close-up of the smile. Inexpensive cameras can't do this. In the dental office, we need a "macro" focus capability. Cameras without good lenses and zoom capacity can't get a close-up smile in focus, and they often "fish eye" the full face. This results in a distortion of the middle portion of the picture, making the nose seem enormous.

#### Image quality/resolution

As a general rule, any megapixel camera—a camera capable of producing 1 million pixels per image—will do well with image quality or resolution. Many newer cameras are capable of much higher resolutions; however for general

### E-mail us your tips, products

We'd like to know more about how dentists use digital tools for cosmetic imaging. Send your emails to [fran.martin@medec.com](mailto:fran.martin@medec.com)

office use, this high resolution is not needed and actually slows the process.

### Flash

For cosmetic imaging, the camera needs a remote or diffused flash. Standard point-flash systems on most cameras will wash out close-up smile photos. Or, the flash will create deep shadows on one side of the image and bright highlights on the other, obscuring detail and making cosmetic imaging difficult. To evenly distribute light, the camera needs a remote flash, which can be attached to a ring flash or flash diffuser.

Other accessories that are needed include lens adaptors, memory media, media reader, batteries, possibly a battery charger and, most importantly, instructions. Finding the right camera and putting accessories together can be expensive and time consuming. If you are a camera buff and want to make up your own package, have at it. For the rest of us, there are several dental packages, which include a good camera and accessories (see "Technology connections" on page 44 for examples).

### Printing

Images can be printed with any color inkjet printer. Good inkjet printers cost well under \$500 and will make a high-quality picture. These prints, using plain paper, cost about a dime. An amazing alternative is the Olympus P-400 dye-sublimation printer, which prints pictures that look like they came from a professional photo lab. Before the P-400, dye-sublimation printers cost thousands of dollars; the P-400 costs less than \$800. It uses special paper; one print costs about \$1.50.

Our most effective means of communication is visual. What we see determines what we understand. New digital systems allow us to take advantage of this in ways we could only dream of in the past. What will be the future hold? I'm not sure, but I do know this. "The future is coming and it will be amazing!" **DPR**

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*Dr. Larry Emmott, a recognized authority on dental technology in America, is a practicing*

*general dentist in Phoenix, Ariz. He also is an award-winning professional speaker, a featured instructor at the Las Vegas Institute, and a member of the American Academy of Dental Practice Administration. He has written hundreds of articles on dentistry, computer use, and management. Since 1995, he also has written a monthly electronic newsletter,*

*Emmott on Technology, showing dentists how to use technology effectively. Visit his Web site at [www.drlarryemmott.com](http://www.drlarryemmott.com).*

#### Photo credits

- Photo of CliniPixFuji S-1 camera on page 38 courtesy of CliniPix.
- Photo of Olympus P-400 dye-sublimation printer on page 38 courtesy of Olympus America.

See Dr. Emmott's "Guide to digital cameras" (Jan. 2001) and printer guide in "4 timely tech tools" (Dec. 2001) online. Click on ALL ARCHIVES under SEARCH CONTENT to find the issue month.

