



Steve McGowan, CDT
Owner, Arcus Laboratory, Kenmore, Washington

LAB TECHNOLOGIES & SERVICES

Dental Laboratory Technology: 2012 and Beyond

Steve McGowan, CDT

Dental technology is a perfect blend of art and science. Dentistry, as is a laboratory technician's role in dentistry, is part of the healthcare sciences. The author has always held the healthcare professions in the highest regard. There has always been a distinction between making restorations for people and making widgets. Teeth are part of a complex masticatory system, which includes soft tissue, bones, nerves, ligaments, and muscles. It is relatively easy to teach someone how to make a crown, especially with today's technology. However, understanding and explaining "why" is more valuable than simply knowing "how."

Until recently, the basic structure of the dental laboratory, materials, and techniques—while constantly being refined—essentially stayed the same. In the past 5 years, however, changes have occurred rapidly. Once again, the question is "why?"

In 2001 the American Dental Association published an excellent report called *Future of Dentistry*.¹ This 170-page, broad-reaching document covered all aspects of dental care from the dental workforce, to public awareness, to disease patterns, and beyond. It also addressed the allied dental professions—including dental assisting, dental hygiene, and dental technology—and painted a very healthy picture of dentistry. The United States has a growing, aging population, and there is a slow-growing population of dentists in private practice. The growth of the population is slightly outpacing the growth of practicing dentists, leaving fewer dentists per

100,000 people. The same growth was true of dental hygiene and dental assisting. In 2010, there were approximately 155,700 dentists in private practice, 297,200 assistants, and 181,800 hygienists.² There are nearly two assistants for every dentist and a little more than one hygienist for each dentist. One could argue that a dental practice can keep one dental technician reasonably busy—that is, a dentist-to-technician ratio of 1:1. Perhaps a ratio of 2:1 might be possible?

But according to 2010 data from the US Department of Labor, Bureau of Labor Statistics, there are only about 49,900 dental technicians in the US, which leaves the ratio at 3:1. To make matters worse, it is expected that the industry will lose another 40% to 50% of dental laboratories within the next 5 years. In the 1990s, there were 14,000 dental laboratories in the US. The overwhelming majority of these dental laboratories—more than 80%—had five dental technicians or less. Dental technology was very much a cottage industry. Today, according to BLS, there are approximately 10,000 dental laboratories and a little over half have five technicians or less. The landscape has clearly changed in a relatively short amount of time. So the question needs to be asked, "Who will make all the crowns?"

OUTSOURCING'S IMPACT

The ADA made it very clear in *Future of Dentistry* that the current and impending technician shortage was a problem. One

of its suggestions was offshore outsourcing. At that point, the concept of offshore outsourcing in the dental laboratory was hardly a topic of debate. It certainly existed, but nothing like today. Now, inexpensive offshore restorations have been a huge topic of debate within the dental laboratory profession. In 2007 the *Journal of Dental Technology* published an article addressing the issue of cheap offshore dental restorations.³ The article detailed the issue of dumping, which was based on data from 1980 to 2005. In today's world, 2005 is a long time ago, based on the rapid rate of change within the laboratory industry. More current FDA data from 2010 showed that 38% of all dental restorations were made offshore, most of them in China. Although the report was prepared in 2011, it was based on 2010 data. From 2010 to 2011, there was a 33% increase in US sales of imported Chinese restorations.⁴

Needless to say, this enormous influx of inexpensive crowns has had a significant impact on dentistry. Not only are dentists in private practices purchasing these crowns, but dental schools are following the same trend, according to Anthony J. Ziebert, DDS, ADA's Senior Vice President for Education/Professional Affairs (personal interview, May 2012). This is perhaps the most disturbing aspect of this issue. A new generation of dentists does not understand what a dental technician does, nor do they comprehend the value that a talented, educated technician adds to the team.

RELATED CONTENT:

Scan this code to visit *Compendium's* Special Report page online, or go to dentalaegis.com/go/ccedxxx. The page features exclusive video commentary on lab technology from Dr. Louis Rose, editor-in-chief, as well as an online archive of Special Reports on a range of topics.

Clearly, if 38% to, perhaps, more than half of all restorations are made offshore, it will have a significant impact on the industry. This directly or indirectly impacts all segments of the dental laboratory industry, from small laboratories to big ones. More than likely, it will affect the larger, less expensive laboratories first and foremost.

NEW CHALLENGES

CAD/CAM technology has helped to answer some of the industry's challenges, including inexpensive offshore restorations and a dwindling workforce. For the most part, CAD/CAM systems have been developed outside of dentistry, and in many cases have been functioning for decades in other industries. Although CAD/CAM has helped to alleviate some of the aforementioned challenges, it has also created a new set of challenges. Larger laboratories can more easily afford these new systems, which can sometimes run in the hundreds of thousands of dollars. However, today more than 50% of dental laboratories have five technicians or fewer. It is much harder for that majority of dental laboratories to justify the expense of some of the CAD/CAM systems. Prices are coming down, but it can still be difficult to justify the expense and hard to expect to receive a return on investment within 2 years or before the technology goes out of date. Many small high-quality laboratories would love to work with some of the newer technology, but they must be careful how they invest their money. A quick look at most dental and dental laboratory periodicals would make one believe every single laboratory and office is using CAD/CAM technology. That might be the way it is trending, but it is far from true.

Many of the materials used with CAD/CAM have been available for decades. Zirconia is a good example. CAD/CAM-generated, biomedical-grade zirconia was introduced about 30 years ago, partly as a way to address the brittleness of alumina.⁵ In

2006, Jerome Chevalier published an excellent article titled *What Future for Zirconia as a Biomaterial?*⁶ Chevalier highlights the problems associated with femoral head implants and analyzes the issues associated with the aging process of zirconia. Proponents of zirconia cite its flexural strength, which is similar to steel. However, while zirconia and other materials may well be viable restorative material options, it would be helpful to have more clinical data prior to their widespread use. The excellent 2011 article *Performance of Dental Ceramics: Challenges for Improvement* by Rekow⁷ et al addresses the challenges associated with today's modern materials and techniques.

INVESTING IN EDUCATION

Evidence-based dentistry has a storied tradition and needs to be implemented more in the profession of dental technology. Since 1990, there has been a 59% decline in accredited dental technology programs. In the same timeframe, dental assisting programs have grown 15% and dental hygiene programs have grown 60%.⁸ My advice for dental technicians looking towards the future would be to invest in education.

There are fundamental building blocks necessary to be a valuable part of the dental team. These building blocks include a thorough knowledge of:

- occlusion and the masticatory system
- anatomy and tooth morphology
- material science (If you understand *why* one material is better than another, you will be a valued resource for your customers.)
- color science

Certainly, there is more to learn, but these are the basics that will transcend the latest technologies and materials. Technicians can apply all of these to any new material that comes along, enabling them to make better purchasing decisions

and become a valuable resource for their accounts. It would be great to see dental technicians more actively teaching these building blocks instead of teaching and selling techniques and products. The *Future of Dentistry* maintains that the laboratory industry should not be the authority on laboratory procedures.¹ That's debatable. At the very least, dental technicians should be involved in that process.

In spite of all these challenges facing dental technology, the future is bright. It is clear that things are very different today than even 5 years ago. It is also clear that the next 5 years will bring even more changes. Change brings opportunity, and opportunities abound.

REFERENCES

1. American Dental Association. *Future of Dentistry. Today's Vision: Tomorrow's Reality*. Chicago, IL: American Dental Association, Health Policy Resources Center; 2002. http://www.ada.org/sections/professional-Resources/pdfs/future_execsum.pdf. Accessed August 23, 2012.
2. Bureau of Labor Statistics, U.S. Department of Labor. *Occupational Outlook Handbook*, 2012-13 Edition. www.bls.gov/ooh/Healthcare/Dentists.htm. Accessed August 23, 2012.
3. Corcoran C. Don't Dump on Me. Anti-dumping and countervailing duties, cases by value of imports. 1980-2005. *J Dent Tech*. Aug/Sept 2007;10-14.
4. U.S. International Trade Commission Import Statistics (Derived from Official U.S. Customs and Border Protection Import Data). www.usitc.gov. Accessed August 23, 2012.
5. Christel P, Meunier A, Dorlot JM, et al. Biomechanical compatibility and design of ceramic implants for orthopedic surgery. *Ann NY Acad Sci*. 1988;523:234-256.
6. Chevalier J. What future for zirconia as a biomaterial? *Biomaterials*. 2006;27(4):535-543.
7. Rekow ED, Silva NR, Coelho PG, et al. Performance of dental ceramics: challenges for improvement. *J Dent Res*. 2011;90(8):937-952.
8. American Dental Association. *2010-11 Survey of Allied Dental Education*. Chicago, IL: American Dental Association, Survey Center; 2012. http://www.ada.org/sections/professionalResources/pdfs/survey_allied.pdf. Accessed August 23, 2012.