

THE EDITOR'S CORNER

The 3D Printing Revolution

While I have been an enthusiastic advocate of enhanced technology in clinical orthodontics throughout my career—albeit rather slow to adopt new technologies until they have a proven track record in other doctors' offices—few developments have excited me more than intraoral scanners and three-dimensional printing. In my experience, the traditional impression procedure generated as much patient anxiety and complaints as anything we did. When I first started using an intraoral scanner, many patients expressed delight at avoiding alginate impressions, and practically every one of them commented on how “cool” the scanning was. When they were able to see the screen, they were always intently interested in watching their teeth appear in extraordinary detail. Our 3D printer is kept in our lab, but I confess to taking the occasional patient back to see the printer in actual use. Since it requires a considerable amount of time to print an appliance, the patient never gets to watch the entire process, so I always keep samples on hand to illustrate the eventual outcome. Like me, the patients are invariably amazed at the technology.

My first exposure to 3D milling (not printing at the time) came several years ago, when I was still at the University of Southern California. Our large faculty practice there was truly multidisciplinary, and I frequently found myself working in an operatory next to a prosthodontist or general dentist. At USC, those dentists were quick to adopt intraoral scanning and milling technologies to produce “same-day crowns.” One of my patients at the time, a professor of mechanical engineering at USC's Viterbi School of Engineering, was involved in research that led to the widespread implemen-

tation of 3D printing in general manufacturing. He was the first person who suggested to me that we could use 3D printing in orthodontics as well. Sadly, although I was intrigued by the prospect, my teaching and patient-care loads were such that I could not devote the amount of time that his project would have required. I think I missed a golden opportunity. Fortunately, others did not.

The first 3D-printed orthodontic appliance that I personally witnessed was a simple plastic bite plate—a straightforward application of the technology. In a short period of time, 3D printing revolutionized the manufacture of clear aligners and increasingly complex appliances. Today, 3D-printed active metallic appliances have become a reality, bringing the future of laboratory wire-bending and soldering into question. In this issue of JCO, one of my favorite contributors, Dr. Benedict Wilmes, and two of his collaborators, Drs. Simon Graf and Sivabalan Vasudavan, present an interesting application entitled “CAD/CAM Metallic Printing of a Skeletally Anchored Upper Molar Distalizer.” Since this 3D-printed metal appliance is anchored by miniscrews, the authors have eliminated both preliminary banding and alginate impressions. It is hard to imagine a more patient-friendly, or doctor-friendly, approach to the fabrication of this complex device.

With more and more laboratories accepting scans rather than impressions, intraoral scanning and 3D printing are fast becoming the dominant laboratory techniques in the industry. I have no doubt that CAD/CAM and other computer-based technologies will continue to advance at an exponential rate, as this month's article well illustrates.

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