

Case study

3M™ True Definition Scanner for digital oral care



HP Z Workstation plays key role in industry-changing solution

Industry

Manufacturing

Objective

Deliver reliable, highly accurate and cost-effective digital impressing

Approach

3M developed the 3M True Definition Scanner solution, incorporating an HP Z Workstation to process 3D digital scans into a composite 3D model

IT matters

- Reliable, business-class hardware design contributes to dental market acceptance
- High-performance processing enables rapid compositing of 3D scans into a 3D model that can be shared as an STL (stereolithography CAD) model
- Hardware platform stability of years rather than months minimizes FDA re-certification requirements
- Delivering full pre-configured HP Workstations streamlines product integration for 3M

Business matters

- Collaborative planning between 3M product developers and HP Workstation experts contributes to strategic OEM technology integration in the 3M True Definition Scanner
- Utilizing off-the-shelf business-class, high-performance technology with an established support network from HP as OEM enhances cost efficiency and reliability



“We get real passionate when it comes to designing a product that will make someone’s life better, and the HP team proved to enthusiastically contribute in our endeavor.”

– David Frazee, vice president and general manager, 3M Digital Oral Care



The dental division of 3M Company, 3M ESPE Dental Products, has been offering best-in-class products to dentists worldwide for some 50 years. When the business recently decided to design a digital impressing system, its goals were straightforward: to offer the most accurate, reliable and lowest-priced system on the market. One critical need for the system: a high-performance workstation to rapidly process 3D imagery. 3M chose to work with HP as the OEM to incorporate a small form factor HP Z Workstation to bring world-class technology and support into the project in the simplest, most cost-effective way.

For roughly 100 years, when dentists have needed to capture an impression of a patient's oral anatomy, they have asked patients to bite down on a soft material that slowly hardens into a negative impression of the patient's teeth. It is a time-consuming process, and some patients have a difficult time with the process.

Accuracy is critical in the impression process. In creating a dental crown, for example, if the impression is off by more than 50 microns—about the width of a human hair—the patient will experience discomfort with their final restoration. A digital impression enables high quality impressions every time.

Imaging for dental impressions

In the 1980s, a dental company began using images of the teeth to create dental impressions. But the expense of that system, combined with some fear of the new technology, kept most dentists from adopting the new technology. After some three decades in the marketplace, only 10 – 15% of dentists adopted image-based impressing systems.

Enter 3M ESPE Dental Products with a history of successful innovation and world-class technology. "We decided as a company that a new digital impressing system would be relevant to our dentist customers, and embarked to take a whole new approach to its design," explains David Frazee, vice president and general manager for 3M Digital Oral Care. "Our goals were an example of the company's stated vision of 3M innovation improving every life."

That vision is realized with the 3M True Definition Scanner solution for dental impressing. The dentist uses a small hand piece that incorporates a powerful 3D scanner. As the dentist scans the patient's teeth, the hand piece captures a true 3D replica of the oral anatomy in real time. These digital scans are then processed into a composite 3D model, which are then sent as an STL (stereolithography CAD) data file to a lab to create highly accurate custom dental appliances.

Accurate dental impressions

Using the 3M True Definition Scanner speeds the process of capturing an impression and produces the most accurate impression available today. The digital process also

simplifies and accelerates creation of dental appliances.

In designing the system, Frazee's team wanted to incorporate best-in-class technology. 3M concentrated on the 3D scanner hand piece, designing it to be like other dental tools—small, light and easy for dentists to manipulate—while incorporating powerful scanning technology.

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But the hand piece, and all the digital data it captures, are just the beginning of the story. The system also requires a high-performance computer to interpret the images and integrate them into a cohesive 3D model of the patient's oral anatomy using specially designed image processing and stitching software.

3M, like other companies, could try to build its own proprietary computer for that purpose. But Frazee chose another strategy: to incorporate leading industry-standard, technology that already existed from an original equipment manufacturer. For that critical component, he chose the HP Z Workstation.

Why HP?

Why did 3M choose HP technology for its image processing needs? "Our business simply isn't about making computers," he explains. "We offer best-in-class products and solutions in our industry and we want to incorporate best-in-class technology."

Frazee says it was obvious to his team that 3M would never be cost-competitive in the long term if it tried to design, build and integrate its own computer into the system. Moreover, he adds, HP has far more experience in offering field support and lifecycle management for computers. Excellent support would prove critical in achieving widespread acceptance of the new digital impressing solution.

Perhaps most important to 3M early in the product development process was the knowledge that HP would be more than



a vendor. “HP offered the opportunity for our key technical project leaders to interact directly with world-class scientists from HP in problem-solving,” he says.

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Together, the 3M product development team and HP experts collaborated in numerous joint deep-dive working sessions to talk through issues around data acquisition, software function, workflow requirements, and the computer architecture.

“We spent countless hours discussing those issues to make sure our dental customers were going to get the best possible experience,” Frazee explains. “We get real passionate when it comes to designing a product that will make someone’s life better, and the HP team proved to be equally enthusiastic in contributing in that endeavor.”

Reliability critical to acceptance

3M chose the Z Workstation in particular for its ability to process 3D images rapidly, its relatively small form factor and durable

design. “A consumer-grade computer from another manufacturer might prove to be a few dollars cheaper, but nothing would damage our reputation among dentists more than a high failure rate,” Frazee says. “There was a lot of incentive to deploy a highly reliable, business-class device.”

HP Z Workstations also adhere to industry standards in terms of connectivity and port design, which is important to 3M. And the global presence of HP ensures that its supply chain can match the scope of the 3M global dental business.

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Also of significant importance is the stable hardware platform that HP offers, which is critical in the medical device industry. “If any part in your product configuration changes, you have to take the time and trouble to renew your FDA certification,” Frazee explains. “A change in the computer platform would

require new FDA and FCC testing. Having a stable platform from HP for years rather than months helps minimize re-certification for minor equipment changes.”

HP also supplies 3M with fully pre-configured Workstations with a customized 3M Linux-based software image that is installed at the HP factory prior to shipment to 3M. The Z Workstation component of the 3M True Definition Scanner solution is fully supported by HP as a field-replaceable unit.

Delivering innovation

How does the 3M True Definition Scanner live up to the vision of Frazee and his staff? “Based on independent testing, our system delivers the most accurate dental impression available,” says Frazee. “And I think most people would agree we nailed it in terms of aesthetics.”

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Moreover, the system is positioned to dramatically increase acceptance of digital impressing among dentists. The 3M True Definition Scanner is sold with a bold, new business model. It is priced at just half the cost of the lowest priced competitive products on the market, with a monthly data plan, similar to cell phones.

“Dentists have told us, ‘It’s about time someone offered a digital impressing system I can afford,’” Frazee reports.

“I can deliver restorations fast and efficiently. The True Definition Scanner makes digital scanning a no brainer.”

– John F. Weston, DDS, FAACD, fellow of the American Academy of Cosmetic Dentists

Dentist John F. Weston, DDS, FAACD, says many dentists have been afraid of digital impressing technology, but there’s really very little to be afraid of when it comes to the 3M True Definition Scanner.

“It’s pretty simple,” Weston explains. “I can deliver restorations fast and efficiently. The True Definition Scanner makes digital scanning a no brainer.”

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