



"The Stratasys 3D printer offers substantial time savings. It only requires a few minutes of setup time and we can print as many as four high-precision jobs a day."

Boris Simmonds / Vulcan Custom Dental



A dental model printed in a single material on the Objet Eden260 Dental Selection.

CASE STUDY

# Quick Dental Procedures

VULCAN CUSTOM DENTAL FINDS IMMEDIATE, COST-EFFECTIVE SOLUTIONS WITH 3D PRINTING

Vulcan Custom Dental (Vulcan) operates a state-of-the-art milling and prosthetic planning center located in Birmingham, Alabama, where it works with dental implant manufacturers and helps clinicians facilitate outstanding patient care. Like other dental technology centers, Vulcan faces numerous challenges: balancing technician workloads, optimizing turnaround times for precision medical devices and staying competitive in a growing international market all while reducing cost. By incorporating 3D printers into its workflow, Vulcan found it could better meet those challenges.

## Immediate Benefits With 3D Printing

Without a dedicated 3D printer, Vulcan regularly outsourced production of printed patient models and diagnostic waxups, extending turnaround by as much as two weeks. Plus, design changes couldn't be incorporated swiftly due to the dependence on outside processing, and excessive costs associated with improved delivery.

Vulcan found advantages with an Objet 260 Dental Selection™ 3D Printer because of its speed, multi-material options, reliability, accuracy and quiet operation over conventional processes and other 3D printers. Repeatability and ease of use was enhanced by efficient support material that didn't compromise print quality.

3D printed substitutes for gypsum models and prosthetic prototypes proved less technique sensitive, more accurate and cost-effective for Vulcan. Vulcan can now promise dental restorations in 24 hours with help from its 3D printer and advanced digital software, and even deliver same-day results in some cases.

"The Stratasys 3D Printer is our most reliable piece of equipment, and is a critical component to working successfully with clinicians at the front lines of digital dentistry," said Boris Simmonds, Director of Technology Development at Vulcan. Vulcan uses the 3D printer to produce all of its dental models, splints and surgical guides. "Even though we run the 3D printer nearly nonstop, we have not had a single down day."

## Efficiency, Biocompatibility and More

Vulcan's 3D printer also simplifies support material removal. With other 3D printers, Vulcan employees had to remove support material by hand, taking time that could have been spent producing revenue elsewhere. Vulcan's predecessor printer consumed on average a half-hour of operator time for tray set up of 12 to 14 models, with 24-hour print cycles and day-long post processing procedures. System failures involving haphazardly assembled print heads, vacuum pumps and printer material cartridges contributed to frequent downtime and costly maintenance programs. However, the Stratasys 3D Printer offers a simpler process that saves time and cost on production. Stratasys' soluble support material is an advantage when it comes to creating parts with delicate design features and easily dissolving material from internal voids.

"We found that the support material can be sprayed off or dissolved with water-based solutions at room temperature, so we can achieve the micron-level accuracy needed for screw-retained dental implant restorations," said Simmonds.

When it comes to biocompatibility and patient safety, Vulcan's production team uses only Stratasys MED610 biocompatible material to create surgical guides, splints and dental delivery trays. This material is proven safe for intraoral surgical procedures in contact with skin and mucous membranes as well as autoclave sterilization.



Dental model printed from three different materials providing a closer match to the case than was possible in the past.



A drill guide printed in clear MED610 installed on dental model.



Full Arch surgical guides printed from MED610

"If the surgical guide goes into the patient's mouth, it must be biocompatible to avoid irritating bone and/or soft tissues," said Simmonds. "Luckily, MED610 has the certifications to ensure our products are compliant with ISO 10993."

In-depth pre-planning and problem solving solutions provided by the capabilities of the Stratasys Objet 260V reduces both the number of appointments and procedure time required for complex cases. 3D printers are a key factor in gaining an edge in the digital dental movement, providing higher standards of care for patients and reduced costs for dental offices and dental laboratories alike.

With 3D printing, Vulcan Dental enables clinicians and labs to expedite their workflow while still providing predictable, consistent and patient-specific solutions.

METHOD USED TO PRODUCE DENTAL MODEL	TIME
<a href="#">Traditional method</a>	48 hours
<a href="#">Competitive dental 3D printer</a>	24 hours
<a href="#">Objet 260 Dental Selection 3D Printer</a>	6 hours
<a href="#">Savings vs. competitive 3D printer</a>	18 hours 75%



The WaterJet cleaning station removes support material without temperature cycling.



Interior view of the WaterJet