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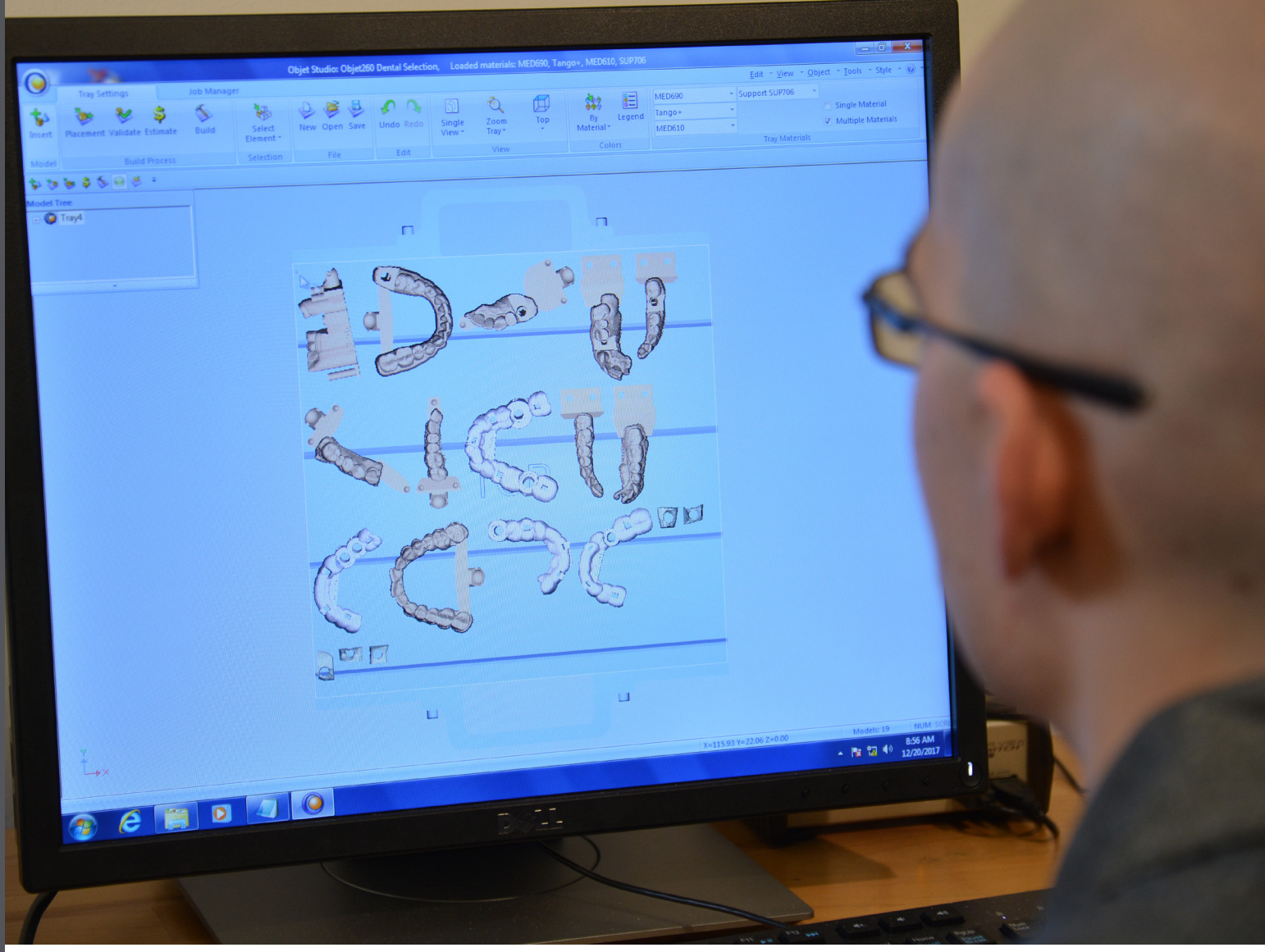


Versatility That Powers Your Lab

Leverage the Value of Mixed-Tray 3D Printing

If you work in a dental lab, you understand the pressures labs face in today's market. Technology disruption, market consolidation, and a shrinking pool of skilled technicians make for a challenging business landscape. But as this Solution Guide will show, opportunities are available that give dental labs the tools to not only remain independent and competitive but also to grow.

Solution Guide

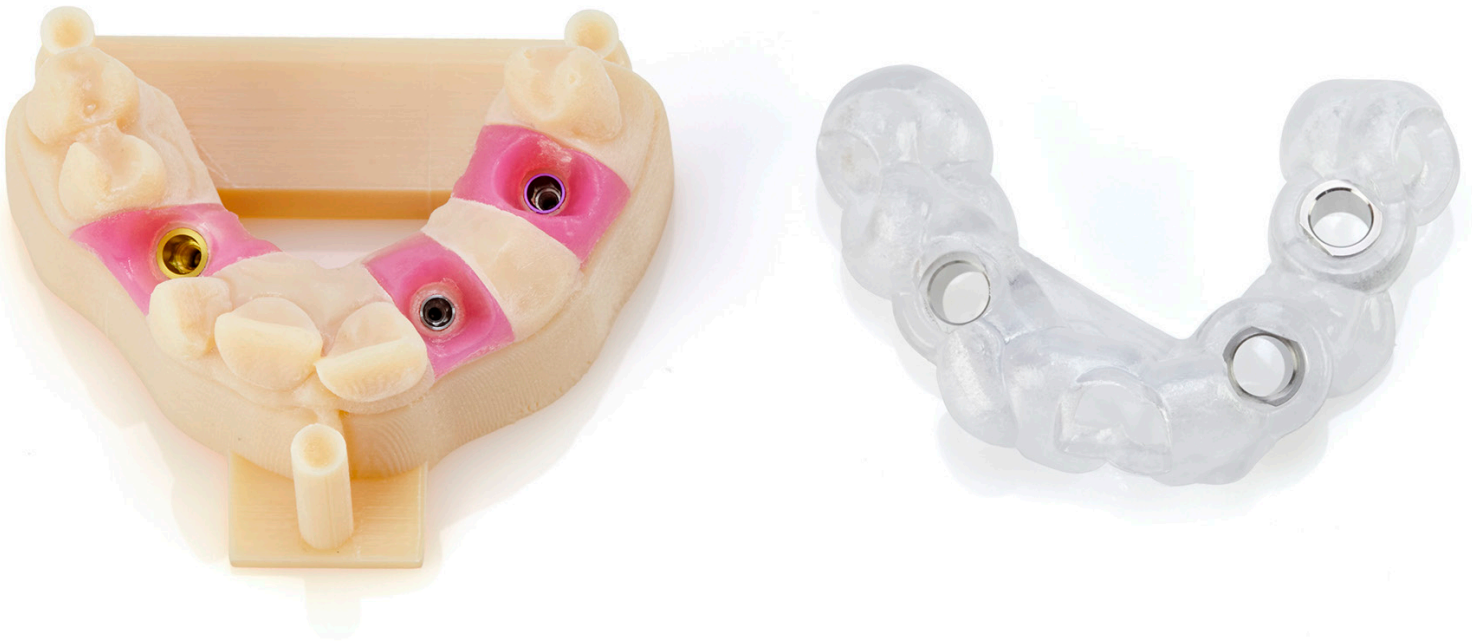
stratasys

3D Printing:
Both A Solution and a Challenge

The current dental laboratory landscape poses an interesting paradox. On the one hand, there is an increasing need for lab services due to an aging population and greater demand for oral care and advanced cosmetic procedures. Still, despite these tailwinds, small and midsize labs have never been at greater risk. The shortage in skilled labor and the capital requirements to keep up with increasing industry digitization makes it harder for labs to compete. Additionally, the trend towards full service labs makes facilities with limited service lines less attractive partners to clinicians.

Enter 3D printing, which has been a boon to the dental industry, automating time-consuming tasks once held by technicians. Single-material printers with their small footprint and lower acquisition cost have allowed many labs to move into digital dentistry. But to compete with full-service labs, small and mid-size labs need to expand their service offerings to support multiple types of cases. While 3D printing has simplified this objective, new applications often require varied materials. That poses problems with single-material printers. Every time you have to change materials you lose productivity because the printer's not producing and your technician is tending to the printer instead of value-added tasks.

Single-material printing also cascades into a workflow problem. Managing the print queues for different types of cases or parts for the same case that use different materials results in inefficient printer utilization. Without sufficient cases to print a full tray with a particular material, the existing cases are frequently put on hold until there are enough to maximize printer utilization. However, this can cause turnaround delays. If you print without maximizing the printer's capacity, you're faced with more frequent material changes and the associated costs and lost productivity.



Implantology: One Case, Three Materials

Consider an implant case example. Implants require three parts made of different materials: an opaque rigid model, soft gingival mask and a clear surgical guide. They all need to be shipped together but the single material printer needs to produce them sequentially. Your first step is to print a series of rigid models, but to maximize build capacity you'll have to consolidate models from other unrelated cases. Next, you'll have to switch materials to print the clear guide. But if there are no other implant cases, you can either wait for more cases to fill print capacity or print the single implant case.

The same scenario applies to the gingival mask. Coordinating the print schedule just to produce a single implant case by the end of the day adds time that a technician could spend on more productive tasks.

One solution is to buy several smaller printers to minimize material swapping. But this requires significant coordination among all of your technicians to ensure the work is done in the right order and with the right materials. Some labs have added headcount just to manage this scenario, resulting in higher operating costs.

Handling and storing the resin used by some of these single-material printers is not a trivial matter either. When changing the printer material, it needs to be properly secured and stored to avoid contamination or exposure to too much light, either of which renders it unusable. Safety is a concern too, because exposure to uncured resin is a health hazard.

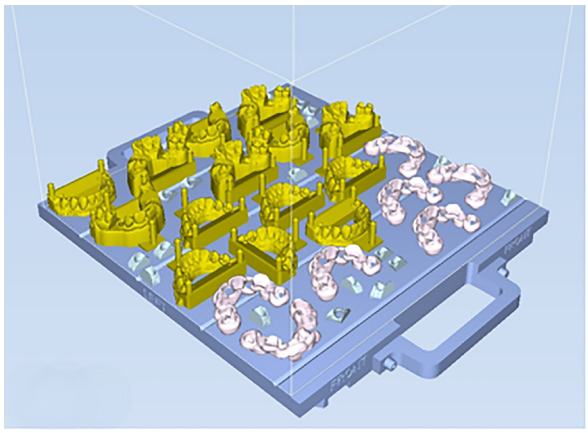
From a workday productivity perspective, while smaller resin printers may print quickly, total output often falls short. Most labs load up a print queue at day's end so new models are ready the next morning. But these smaller printers are only capable of building a few models at a time. The printer may complete the job quickly but that benefit is negated when there's no one available to load the next job. Increasing overnight production means either adding a technician during night hours to reload the printer or using a printer with more capacity.

Maximize Productivity with Mixed-Tray Printing

One of the most effective ways to maximize your lab's productivity is with multi-material 3D printing. It gives labs the versatility of mixed-tray printing. That means labs can make models in different materials during the same print job on the same build tray. There's no need to wait for sufficient parts to print in one material and then change to another material for other parts. You print the parts as you need them, whether they're crown and bridge models, cast partial patterns, clear aligner arches or implant models and guides, regardless of material requirements. That offers significant workflow efficiency.

For orthodontic labs, mixed-tray printing provides the ability to produce mixed trays of clear aligner arches, study models and flexible indirect bonding trays with biocompatible materials. This radically streamlines your workflow and gives you the flexibility to print what you need when you need to without having to wait for the printer to finish in order to change materials.

Simpler case workflow management is another benefit of a mixed-tray printer. You can print the entire implant set – model, gingival mask and surgical guide – together. This saves time and avoids errors when matching all the parts for the right case, which often happens when they can't be printed together. Simply locate all components for a specific case together for easy identification and workflow management.



Six full implant cases organized for printing.

Arches printed in modeling material, guides in transparent, and gingival mask in flexible.

Implantology is an application where mixed-tray printing offers a game-changing solution. A lab can produce all three components at the same time, each with its own material. Use rigid opaque material for the upper and lower implant models, flexible material for the soft gingival mask and a clear material for the surgical guide. Single-material printers are limited to one of those parts per print. To complete an entire case, you would have to change materials twice and print parts sequentially or use additional printers, each dedicated to one material.

Multi-Material vs. Single-Material Printer Productivity Comparison

To validate the capability of multi-material printing, Stratasys compared the Objet260 Dental™ Printer to several competing single-material dental printers. A surprising result involved the total number of "touch points" needed to produce parts, a factor not readily apparent when comparing printers. Touch points reflect the number of times a technician is involved in the printing process. That includes time to empty and reload the printer, change materials and post-process the parts.

Counterintuitively, the faster the smaller printers produce parts, the more labor, or "touch points" are needed to manage the printer, effectively minimizing or negating productivity benefits.

The scenario described below summarizes the findings of these comparison tests, using a seven-case implantology print load scenario. A seven-case scenario was chosen because it represents a fully-packed tray on the Objet260 Dental, using three distinct materials for the models, gingival mask and surgical guides.

Mixed-tray printing gives dental labs labor scalability, minimizing the amount of touch time needed to produce models and appliances. In contrast, smaller, single-material printers shift the labor from manual operations (building models and appliances) to managing the 3D print jobs. Instead of you running the 3D printer, the 3D printer ends up running you. That point is often missed when evaluating 3D printers.

Seven-Case Scenario

- **Case Turnaround Time:** Next-day results for the Objet260 Dental vs. four days for a single-material SLA competitor
- **Total touch points:** Four touch points for the Objet260 Dental vs. 21 (5X more) for one competitor and 41 (10X more) for another competing printer. These touch points include:
  - Printer setup and job initiation
  - Waiting for slice time
  - Swapping trays
  - Support removal for each tray
  - IPA (isopropyl alcohol) rinse and dry
  - Post-processing
- **FTE burden:** The Objet260 Dental required a partial resource (headcount) to complete the seven cases whereas competing printers required a full-time dedicated resource or multiple resources to manage all of the touch points

3D Printers with Mixed-Tray Capabilities

Multi-material 3D printers with mixed-tray capability have been the go-to tool for large dental labs but have been out of reach for smaller and mid-size labs, mainly because of cost. The Stratasys Objet260 Dental multi-material 3D printer fills this niche. It's a powerful system affordably priced so small and mid-size labs can expand their service capability and grow their business.

Use multi-material printers to expand your lab's capabilities with the addition of color and the ability to tailor model properties with digitally mixed materials.

Give dentists more realistic models for better patient engagement with accurate color. It's particularly useful in denture mock-ups. Color also lets you differentiate your products in an otherwise competitive space. Some labs use different colors on models to highlight the treatment area and final outcome for the patient, enabling more constructive dialogue between patient and clinician.

How Mixed Tray Delivers Value

Implantology

Mixed tray printing with biocompatible materials makes it well-suited for implantology cases. Use MED620™ for the upper and lower models and flexible MED625FLX™ for the soft gingival mask. For the surgical guide, use clear MED610™ material.

Orthodontic

All of the biocompatible materials mentioned above can also be used to generate full trays of orthodontic aligner molds and indirect bonding trays.

The ability to use all of these materials at the same time for mixed-tray production is a valuable productivity enhancement that labs can use to drive growth.

3D printing single-application cases isn't productive if you can't maximize the printer's capacity. Single-material printers may print quickly but at the cost of increased touch labor. Instead, be more time-efficient and productive with mixed-tray printing, maximizing your printer's capability and your technicians' time.

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