



First Look: 3D Printing In-Office—What Do You Need to Know?

Interview with Wolfgang Friebauer, Director of Research and Development, Glidewell Dental August 7, 2017

1) Why did Glidewell Dental start using 3D Printing? When did they begin using this technology at Glidewell?

It really allows you to streamline work flow, since we always sectioned work steps in the procedure of manufacturing. 3D printing technology was a big help. Instead of having a lot of technicians doing the same thing in line, streamlining your work process always helps in quality and quality management. With that in mind, the printing was not only speeding up the procedure, but also giving us the quality that we wanted. It's the same quality that we have in the software, which gives you precise, high-quality, repetitive results. So in those terms, that was definitely something that helped us.

We were early adopters with the first machines coming to market. The first 3D printers we used were 3D Systems' Invision HR back in 2005, but the first generation that were really reliable were EnvisionTECs and 3D Systems' Projet. We looked at other technologies soon after, like Alterra. The list of printers that we've used is quite long.

The biggest change was when the first patents ran out and everybody could build printers, especially with resin printing. I would say that we looked at the less expensive machines right when the first desktop machines entered the market, maybe five to six years ago.

2) For what applications is Glidewell Dental using 3D Printing? Which are the most popular? What are the typical turnaround times and costs for these applications?

The dental industry still uses the lost wax technique for metals, as well as for ceramics, where you create a form for something that you can cast into or press into. This method is still in use, even with the integration of metal selective laser sintering. The lost wax technique is done by pressing ceramic down to a SLS coping on top. Casting did disappear in crown and bridge work at Glidewell, but it's still there in partial dentures. It's a combination. Crown and bridge work uses selective laser sintering in 3D, as well with anatomical parts with resin printing. It's big, and it's going to get bigger with removables and implants, as well. The fact that intraoral scanners will get more popular in the dental offices, will make models obsolete. That means that you still get data and might need model work here and there. While model printing is big right now, it won't be for long. Model free is the goal.

The market exploded with equipment and continues to do so with materials that are coming. I would say that now you can buy filament printers for \$100-\$150, as hobby market items. More serious equipment, in filament printers, are anywhere between \$500 and \$2,500. Granulate printers for \$80,000. Resin printers, with light cure technique, starting at \$1,000 for desktop printers. More serious ones range from \$40,000 to \$50,000. Then you have the stand-alone ones that can go up to \$250,000. So, it's still a huge market out there as far as 3D printers are concerned and it's still growing. Resin printers are the most popular at this point.

A batch of about 50-60 units can be printed at one time within 2 hours. This is huge in comparison to the traditional methods of producing wax castable units by hand one at a time.

So, do we use all of these in house?

We have tried filament printing, because we thought that there was something we could use for the thermoform parts, but we've stopped for now. This option is way out at this point, but we still have an eye on it. The resin printers, yes, we use them in-house and we have all kinds of shapes and equipment at all cost ranges. Right now, we use the metal printers for crown and bridge substructures, partials might be next, but right now it's very difficult to get your return on investment out of the equipment for partial frames. In order to get your ROI, the machines will need a large production workload to be viable, but there's a development aspect there, too. As those patents for the machines run out, they will get less expensive, due to more competition leading to lower costs. Maybe not to the level of resin printers, but less expensive than what they cost now.

3) What brands of 3D Printers is Glidewell Dental using currently? Why these brands?

We have multiple brands in use. The ones that are entering the lab right now are Structo and Octave Light. There are benefits to them as new machines, new equipment, and new ideas. There are consumables with this, not just the material. That is, some of them operate with kind of a little bowl where your resin is in, called vats. You should avoid consumables. You want to use something inexpensive with as much quality as possible. That's all developing right now. Engineers are working on new ideas on how to make improvements concerning speed, quality, and cost.

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4) To what extent is laser sintering technology used at Glidewell Dental? What products are made and sold by Glidewell, using this technology?

Like I said, we have 3D resin printers for light cure and we have selective laser sintering for metal melting. We're on the start of getting deeper and deeper into this in our dental world. The hearing aid industry and other industries have developed 3D production quickly around us. What we had in the dental world was still a lot of hands-on. Those 3D machines and those new techniques, they're coming now and they will help us to streamline more of those procedures for our products, thus making them more affordable to everybody.

Crown and bridge is there, Obsidian Fused to Metal. We use it for all ceramic pressings and for model fabrication in thermoform.

5) What in-office 3D Printing solutions does Glidewell Dental offer and/or provide service for?

I don't think that we're doing unfinished product goods for other laboratories at this point. Not with printing. I think we do it with BruxZir Solid Zirconia as a milled product, but I don't think we do it with printing. That would be a question Glidewell Direct could answer, if they decide to offer that service. While other companies might be doing it, we're not offering it at this point.

6) What advice does Glidewell Dental have for any clinician considering purchasing an in-office 3D printer for their practice? Are there new exciting developments coming?

I know that there are two products out there right now that can be used as temporary device printers. Multiple tooth colors are available and like I said, more materials are being developed right now. There's an existing system that is from Italy, DWS, and one from Korea, called RAYDENT. They both have long term temporaries and very nice systems. There is probably more coming in that direction, which will ease the temporary device market. I'm not sure if there will be something that will go into the fixed device for in-office printing. I don't see it at this point, but maybe down the road it is possible.

Time is of the essence for the doctors' offices. Milling is already there. Chairside milling works well. It's an easy solution and saves dentists money. In terms of printing, it has to be fast, it has to be accurate, and it has to be easy for the doctor. I can see temporaries with an easy polish on the end, but ceramic and glass printing are far away at this point. They need more development in terms of speed and ease of handling. For the final product, right now milling is the better option.

How far away do you think it is?

I would say years for the doctor's office. The equipment will be more involved financially and space-wise for the office.

Specific images to showcase?

We've always been neutral in what we talk about. There are two companies that have chairside temporary equipment and materials. Like I said, one is DWS in Italy, they have a system, and then there is one from Korea, RAYDENT. They are very easy desktop machine units that are combined with light post cure. I think the FDA approval is there. These are ready to go solutions. There will be more over time.

