DIGITAL DENTISTRY
CONSULTANCY
KNOWLEDGE TRANSFER

| What | Who | How | Why

Perfectly printed or milled?

I think I can - Part 1

Do you remember the tale of Goldilocks and her thoughts on the porridge presented? She had a choice of three bowls found one that was just right, so the fairytale goes. The same analogy can be applied in dentistry and in this article, we'll look at two choices available and maybe come up with a third that is just right. Most of the time, milling or printing predictably, consistently, efficiently and accurately is more important than "using less material and associated labour costs".

In part one of the two part article, I will discuss some of the pros and cons with 3D printing. As an example, I might prefer printing without supports. Do you use multiple supports, especially if there is a tricky or complicated part such as a model base for a denture (think V-palate), surgical guide or a complicated geometric shape such as RPD or Orthodontic appliance?

There are technical and clinical factors involved in different Additive Manufacturing (AM) techniques influence the effect overall of quality, the mechanical properties of the printed parts, and the total cost and manufacturing time. Conclusion: AM is promising and offers new possibilities in the field of prosthodontics and orthodontics. I'm thinking digital dentures, surgical guides, RPD's (metal, PMMA, the polyaryletherketone family), orthodontic (metal and PMMA) appliances and more. Understanding these limitations and developments in material science is crucial prior to considering AM as an acceptable method for the fabrication of your dental prostheses.

Do we need to change our thoughts on the expectation of longevity when we think 3D printed dentures? So are we there yet? Not quite but not that far off either. Watch this space as they say. Are 3D printed dentures as good as milled, pressure injection or press and flask? Maybe yes; maybe no. Are they a cost effective alternate for patients to have them functional and smiling again? Absolutely, especially when we look at waiting periods for State based oral care programs. If a patient loses them you can print a provisional denture and post them if need be.

Let's have a look at the process starting with the patient, establish what the patient could expect without any impressions or wax up models. Utilise your smile protocol, take some photos of patient smiling and import these images into smile design software and discuss what could be achieved with shape, form and function. If the patient likes what they see then rebase the patient's denture, establish the vertical dimension and scan these denture parts, clean the denture and hand the denture back. All of this could be achieved in 20-30 minutes. This technique should be considered especially with any implant prosthetics. That was two steps and time saved utilising a digital workflow.

The great aspect with 3D printing dentures is the use of prototypes for try-ins over existing teeth prior to work commencing, establishing vertical dimension, not using tooth cards and more. Any adjustments to the final design, vertical dimension, tooth shape and form and the patient wishes observed, such that a final denture fulfils all wishes and needs met.

The use of 3D printed dentures is certainly evolving. The actual mechanics also depend on which 3D printer you are using or considering to buy. There are two units available that will print all in one (think a bubble jet), yet most units advertised print one material at a time. With that comes the meccano set of 3D printed parts to put together.

Technical limitations may include the nature of the patient's palate like a V shaped palate. So before you print the object (which is probably complex) is divided by the CAM software and the Z value is set (layer thickness). Depending on your Z value you could be printing 600 layers at 100µm or 2,400 layers at 25µm for a vertical height of 60mm. To print each layer accurately, the build platform and material tray should be level and remain parallel. Any unevenness will need a lattice of support structures.

3D printing is like the analogue pressure injection, casting or flask and pack techniques. The denture or casting is surrounded by an open but supported chamber of investment or stone. All areas are supported so the liquid is supported without deformation during processing. So that indicates you don't just push the button and accept the auto support setup. It requires your input and knowledge like the old days.

So as Goldilocks found there was a just right porridge through trial and error and 3D printing is just like that. You have multiple choices with different price points and offerings. Understand what you are trying to achieve and why. Be prepared to invest time into learning and don't think that you can press the button and hey presto it's ready.

In Part two, I will discuss some milling limitations related to techniques.

As in all things, sometimes you need just need a helping hand to understand the basics in order to decide on the digital infrastructure best suited to your situation. That is why Digital Dentistry Consultancy (DDC) is here to help you with your big picture plan. DDC can engage with you at the level matching your needs when and where you require specific advice or support. I look forward to hearing from you or where possible meeting with you to form that long-term relationship.

Cheers
Geoff

Geoff Staples can be reached at DDC on
E: enquiry@digitaldentistryconsultancy.com.au
W: www.digitaldentistryconsultancy.com.au
M: +61 466 788 797