# New Implaguide:

# The affordable guided surgery solution

By Terence Whitty



"Implaguide is a new system using software and 3D printing technology to create a unique style of surgical drill guide. Planning is done in software using a CBCT scan..." ccurate placement is a key success factor in implant dentistry. In recent times, the ability

for clinicians to move from a largely freehand approach that relied heavily on experienced hands and calculated guesswork to hyper-accurate computerised diagnosis, treatment planning and precision placement using guided surgery has accelerated.

The contemporary implant surgeon can now diagnose using 3-dimensional radiographs captured using cone beam computed tomography (CBCT) systems, often installed in their own practices, that accurately reveals the amount of available

bone, its quality and the position of nerves and other relevant anatomical characteristics.

Clever treatment planning software then allows virtual implants in varying lengths and diameters representative of the inventories of all major brands



Figure 1. Implaguide single site implant guide.

on the market to be positioned onto the radiograph in three dimensions. The most appropriate option can then be chosen based on appropriateness for the individual situation together with clinician brand preference.



Figure 2. Implaguide multiple site guide.





*Figure 4. After the CBCT is loaded, 5 view windows are shown: Cross Section, Axial, Tangential, 3D Surface, and Panoramic.* 



Figure 6. Nerve tracing/definition is an easy process.



Figure 5. Tracing The panoramic Curve. This basically sets the field of view.



Figure 7. Nerve tracing: cross sectional view showing nerve exiting the mental foramen.



Figure 8. Multiple views of nerve tracing.



Figure 10. Merged model.



Figure 12. Most major implant brands/types are available in the library or you can create your own custom implant.

Finally, the treatment planned in the software can then be utilized in the production of surgical guides that the clinician uses to control the trajectory of the implant surgical drill during surgery. In unison, these technologies facilitate precise implant placement in three planes that contribute significantly to the long-term success of the treatment.

In addition, as well as planning the optimal surgical pathway, consideration can also be given at the planning stage as to how the implant will be restored. The days of the technician having to "clean up the mess" with less than ideal abutment angles to restore should, theoretically, be a thing of the past when guided surgical techniques are employed.



Figure 9. Merging a model scan with CBCT rendered model. An intra oral scan be used as well- the more data, the merrier!



Figure 11. Placing the virtual tooth is simple and negates a separate radiographic guide in most cases.



Figure 13. Placing the implant in multi-view mode.

Guided surgery is particularly applicable in edentulous patients who generally have significant bone resorption. The extent of resorption together with a survey of the available bone and its quality is not only key in planning implant placement, it is equally decisive in determining the kind of implant-supported prosthesis to be used. Selection of an appropriate prosthesis type is fundamental at the treatment planning stage and should not be an afterthought. In addition, the creation of a virtual patient using highly accurate 3D radiographs on which to plan treatment is only the beginning. Additional data can be incorporated into the virtual environment and overlayed with the radiographic data to offer an even more comprehensive diagnostic aid.



Figure 14. Implant placement: any window can be enlarged to show endless detail.



Figure 15. View showing rendered CBCT scan with model merged, nerve traced and virtual tooth on an implant. Amazing multiple views are possible to realize relative positioning.



Figure 16. A full report can be generated and saved in PDF format for reference.

Intraoral soft tissue scans (digital impressions) and optical scans of plaster models can be merged and radiopaque scan appliances with "markers" to aid in orientating multiple media into a single comprehensive virtual patient can further be incorporated.

Using software to merge an optical scan of the patient's dental models with the 3D radiograph allows direct feedback between the current tooth position with tissue and osseous anatomy. Other data such as scanned wax-ups and scanning appliances incorporating radiopaque markers can also be merged.

This allows a comprehensive dataset to be compiled that is then used in the construction of a surgical guide, or more accurately, a drill guide. Today, surgical guides can be made with great precision in this manner using computerised manufacture (CAM).

Surgical drill guides effectively facilitate the transfer of the starting position and trajectory for the implant drill that was

determined as ideal based on the virtual treatment plan. A "drill stop" is then used to limit the depth of the drill, again based on the virtually determined ideal.

There is little doubt that using guided surgical techniques for placing implants increases the accuracy and predictability of treatment outcomes. The major barrier to more widespread adoption of this modality has largely been the cost and time involved in manufacturing the guides, which has largely been completed offshore.

Today, prices are reducing as competition for surgical drill guide production increases. The major players in CAD software design, like 3Shape, exocad and Dental Wings, are all releasing implant planning software that allows the production of surgical guides and this supplements existing software programs from implant and x-ray manufacturers that have already achieved significant market penetration.





Figures 17-19. Radiographs showing completed using Implaguide for perfect positioning.



#### Introducing Implaguide

In addition, a new Australian made product marketed by the author has so far proven to be very popular for helping to plan and place implants.

Implaguide is a new system using software and 3D printing technology to create a unique style of surgical drill guide. Planning is done in software using a CBCT scan merged with the patient's scanned plaster models.

Virtual teeth are placed and then the implants are optimally positioned in relationship to all available data. The economical Implaguide surgical drill guide is then manufactured from this data and incorporates stainless steel drill sleeves for guiding the drills. Drill stops can then be used to limit drilling depth.

The images accompaning this article show the steps involved in planning an Implaguide using the free Blue Sky Plan implant planning software together with the final result.

#### About the author

Terence Whitty lectures nationally and internationally on a variety of dental technology and material science subjects and runs a busy laboratory in Sydney's Eastern Suburbs, specialising in high tech dental manufacturing. Using the latest advances in intra- and extraoral scanning, CAD/CAM and 3D printing technologies, most specialties are covered including fixed and removable prosthetics, orthodontics and computer implant planning and guidance. He also specialises in the latest injection systems for traditional and CAD designed removable prosthetics and various associated dental appliances including Sleep appliances. His articles appear in various international journals.

For info on Implaguide, Blue Sky Plan software or this article, contact Terry Whitty at info@trulinedental.com.au or for info on BlueSkyBio, contact Adam Dental on 1300-449-262.