The concept of digital study models has often been talked about, particularly in orthodontic circles, as a solution to the considerable physical space required to store plaster models. If a model could be scanned in three dimensions to a high degree of accuracy, stored electronically and then reconstituted should the need arise some time in the future, then the need for physical storage of models could potentially be eliminated.

While there has been talk of this, little in the way of real solutions have been available. Study model scanning services exist but often if you look at the fine print in their terms and conditions, you may not even own the scans of your own models! A more practical alternative is to be able to scan study models in your own laboratory rather than sending them out to be scanned by a third party.

Digital models have many advantages. They are easy to make, inexpensive, very accurate, cost very little to store and transportation is a breeze. Amazingly, you can store over 800 sets of models on one DVD-R disc or an average 500 GB hard drive could hold a staggering 100,000 sets of models! Much better than rooms and rooms full of study models.

Fig. 1. Maestro 3D Dental Scanner.
Fig. 2. An example of MMR (Maxillary and Mandibular relationship) scanning.
Fig. 3. An example of impression scanning.
I have been working with digital models for some time and have examined several systems on the market today. I have recently found a great new digital study model system with a host of very "useable" features and the best news of all is that it is very affordable.

The Maestro Scanner system consists of a digital 3-D scanner and various software programs so you can easily scan dental models, manipulate the data in various ways and then easily share this data so anyone anywhere with the viewing software can visualise the digital models.

The Maestro Scanner is a smartly designed state-of-the-art structured light 3-D scanner. It uses patterns of light and two digital cameras to measure the surface of the model in three-dimensions. Projecting a narrow band of light onto a three-dimensionally shaped surface produces a line of illumination that appears distorted from other perspectives than that of the projector, and can be used for an exact geometric reconstruction of the surface shape. This is the basis of structured light scanning and in this case, uses no lasers so it's completely safe for anyone to use. It also has great accuracy and is quite speedy in operation. This type of scanning is used by many dental CAD/CAM manufacturers so the technology is well proven for our market.

The Maestro System comes with the Maestro Easy Dental Scan program and I have to say, the name says it all. Put your model into the scanner, click a button or two and you are on your way to a scanned model. However, diving deeper into the program allows you to uncover more complex features if you wish. It even allows you to scan crown and bridge models and acquire multiple dies (up to 8) in one scan. Some of the more advanced C&B scanners are not able to do this. Remember, digital study models are not just for orthodontic purposes but can be used for all dental models. It's a great way to diagnose, discuss and store models.

The quality of the scans is more than impressive with a great amount of detail once the scans are processed. Once you scan the upper and lower models and do a quick occlusal scan, the registering of the scanned models into the correct bite relationship is completely automatic. This is a feature I really like. You can also register the models in various relationships—centric relation; centric occlusion; protrusive or construction bite to name a few. There are also various editing and measuring tools provided and you can do adjustments to the scans if need be. You can save the finished files in industry standard STL or a proprietary ORTHO and ORTHO iPAD file format. File sizes are quite small and easily emailed to clients.

One of the additional notable features of Easy Dental Scan is the option to batch scan.
In many systems, immediately after the scan is completed, it is processed which can take quite a bit of time. With the batch scan, you can quickly scan several models and then complete the processing of the scans at a later time. You simply walk away and the computer does all the work while you get on with something else.

There is also an Ortho Studio program. This starts with a powerful and cleverly thought out database section. Sets of models are sorted by Dental Practice–Dentist–Patient and this is great because it's very easy to find what you are looking for. It only takes a few minutes to master this section. It is just so easy to use.

When a set of models are loaded, all the information from the database accompanies it so you know exactly what you are looking at. In this section of the program, you will find tools for adding virtual orthodontic bases using various popular angles including ABO 2013, measuring tooth and arch width, occlusal mapping, multiple views, snapshot, printing and much more. It's extremely easy to use and you are guided through each step in a wizard-like interface. The latest version of Ortho Studio has the ability to perform complex digital diagnostic set-ups and the ability to create files ready for aligner therapy as well as orthodontic bracket placement. This is a powerful system and a valuable tool for any practice or laboratory.

A real bonus of the package has to be the free Ortho Studio Viewer. This program is a cut down version of Ortho Studio but is still feature rich enough for using digital models for diagnosis on an everyday basis. The viewer includes tools for measuring tooth and arch width, occlusal mapping, multiple views, snapshot, printing and more. Of course it’s very easy to use so people will actually use it! This is a great program to give away to people you want to share your digital files with. For example, you may be a lab scanning models for various clients. You can distribute the free viewer to these clients so they can use it to view and diagnose direct from the scans.

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**Fig. 7** Brackets positioning in Maestro 3D Ortho Studio.

**Fig. 8** Attachments positioning in Maestro 3D Ortho Studio.

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**About the Author**

Terry 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 extra oral scanning, CAD/CAM and 3-D 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. His articles appear in various international journals. He can be contacted at [www.trulinedental.com.au](http://www.trulinedental.com.au).