

ADVERTORIAL

# Practice development: The economic case for CAD/CAM custom foot orthoses

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Dissatisfaction with off-the-shelf and manually produced custom plantar foot orthotics persuaded one busy practice to purchase a CAD/CAM system. That decision has proved to be both a sound clinical and economic investment.

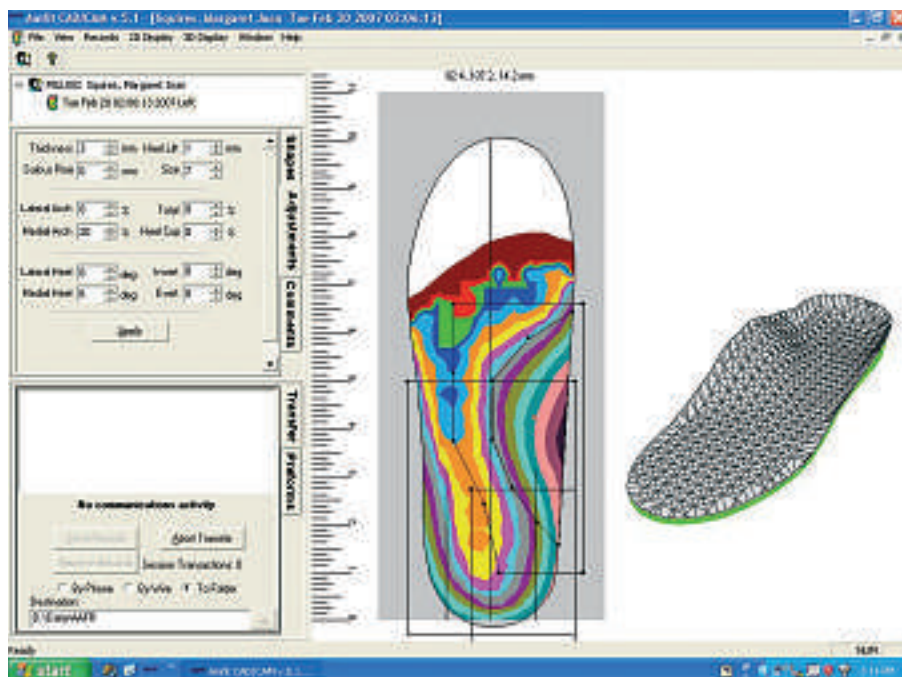
I established my private practice from scratch 17 years ago, after previously working for Fife Health Board. The practice has grown steadily over that time, and there are now three podiatrists working from two foot clinics.

It has always been important to me that the practice remains up-to-date in terms of facilities, equipment and training. Each time that a new piece of equipment is required, the expense can be justified if there is a 'need', such as if it is a vital instrument or a statutory requirement. When faced with a 'want', the economic justification process is less straightforward, and takes longer. This was the situation facing the practice when looking at alternatives to traditional, manual techniques of fabricating prescription foot orthoses.

The cost benefit of traditionally fabricated orthoses for both patient and practice was giving some cause for concern. Patients for whom off-the-shelf devices were inappropriate required custom orthoses. The traditional methods of casting and subsequent fabrication steps were time-consuming, messy and hit or miss in terms of accuracy. Storing plaster casts was also an issue, together with problems associated with sending casts to orthotics laboratories and the delay in receiving the finished item.

The development and application of Computer Aided Design and Computer Aided Manufacture (CAD/CAM) technology to foot orthotics had been demonstrated successfully in the USA as a commercially viable method for replacing most of the normal orthotic fabrication stages.

I decided to explore the options in 1999, but concluded then that the market awareness of orthotics in the UK was



Screen shot displaying 2-D and 3-D image of scan with prescriptive adjustments.

insufficient for me to justify the expense. However, in recent years, there has been considerable market acceptance of the benefits of custom orthoses, particularly in certain sports.

To give an idea of the potential, in the USA, Foot Solutions® maintains that well over 90% of professional sportspeople wear orthoses.

Footwear manufacturers, such as Ecco, Christian Dietz, DB Shoes, FootJoy (golf) and New Balance (running) have increasingly made available products with removable footbeds and are suitable for the insertion of a full-length orthosis. This, combined with the more general

acceptance of orthotics by the medical profession, convinced me to re-evaluate CAD/CAM in 2004.

### Features & benefits

The main problem was which system should I select? It was necessary to list the clinical, economic and practical criteria by which I could make a decision:

- **Proven technology.** The ability to achieve full, partial and non-weight bearing digital casts as required, allowing for complete flexibility.
- **Reliability of the hardware,** which is particularly important if the equipment is sourced from abroad.

- **Software** should be powerful yet intuitive, and able to produce complex prescriptions on screen with WYSIWYG (What You See Is What You Get).
- **Portability.** The foot scanning equipment must be robust and compact enough to allow frequent travel.
- **Affordability.** The equipment cost, consumables cost and therefore the final price to patient must be affordable.
- **Clinical efficacy, durability and wearability.** The orthoses must produce the desired effect, fit the patient's footwear comfortably and have an acceptable life span.
- **Speed of data capture and fabrication** (time = money). I did not wish to rely on an overseas laboratory, and also wanted as much control over final design of the orthoses as possible. I realised that I might need to purchase a complete system if no laboratory in the UK used the same system.
- **Accuracy and repeatability.** The ability to fabricate subsequently additional orthoses that are identical to the originals.

### My decision

In November 2004 I decided that the system that satisfied the above criteria was an Amfit® orthotics fabrication system. The company is based in Washington state in the USA (GMT-8 hours), and is the world leader in the manufacture of CAD/CAM foot orthotic systems with over 30 years' experience.

I opted for the complete system, which comprises Footfax-SLTM 3-D Contact Digitizer, notebook computer with Correct & Confirm™ software, floor stand, flight case and CAD/CAM mill. The mill was required as I wished to keep the fabrication process in the UK for speed and efficiency.

The digitizer allows a 'digital cast' of the foot, each foot being scanned in full, partial or non-weight bearing mode, with the resultant files being stored on the computer. These files are imaged as a 2-D colour elevation image of the plantar surface of the foot and a 3-D image of the resultant custom orthosis. Prescriptive alterations to the scan, such as wedges, ramps, arch support, met pads, heel lift/cupping etc. can be applied using the software tools. The effects of these changes are seen on the screen, and the 3-D image can viewed from various angles. The base thickness of the orthosis can be as thin as 1.5mm, and so can be accommodated by a wide range of shoes.

The Amfit® system is designed primarily to produce full-length, semi-rigid orthoses. These can be trimmed, post milling, to three-quarter if required. There

is also a range of 80-plus pre-forms, from which the most appropriate can be selected by the software following the scan.

A positive can also be milled and then used to fabricate rigid orthoses from carbon fibre ('Stealth'). The main orthotic material is EVA, and the blanks come in a range of sizes, styles and densities, including dual densities. The blank is injection moulded, and the EVA therefore offers high resistance to 'bottoming out'. Templates are supplied in order to help choose the best fit blank for the patient's footwear, and therefore reduces the amount of post-milling adjustment. Having the mill also meant a large stockholding of blanks, as I needed to ensure having a fairly full range to cover all eventualities.

After milling, a top cover can be applied; these are usually leather, Cambrelle® or Spenco® but for certain patients, such as sailors who get wet feet, the orthosis is left uncovered.

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## “CAD/CAM is a commercially viable method for orthotic production”

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### Our experience

In February 2005 the equipment arrived and, after my colleagues and I familiarised ourselves with the system, we 'went live' the following month. I can therefore report on two years' experience with the system.

The first discovery was that demand was high, a comforting thought given the financial outlay. Apart from the existing bank of patients, patients have been referred by other podiatrists, GPs, physiotherapists, osteopaths, remedial therapists and select shoe retailers. Indeed, several of the referrers have become patients. Our advertising has been by way of three 'advertorials' in the local press and leaflets sent to potential referrers.

The number of enquiries increased to the point where my associates and I set up a computerised private practice system (PPS by Rushcliff) which takes care of diaries, patient records, accounts etc. The existing podiatry telephone number was then diverted to a call-handling bureau, where the eight women were trained to use PPS, their database synchronising with ours. This enabled us to concentrate on treating patients as well as handling biomechanics/orthotics enquiries on a second telephone number.

When patients are referred to the practice, a biomechanical assessment is

undertaken, for which the patient is charged. Around 84% of those assessed are prescribed custom orthoses as part of their treatment. The results have been better than I could have predicted, with an efficacy so far exceeding Amfit's 97% experience in the USA. After two years, not one pair of orthoses has worn out; even so, patients have asked subsequently for additional pairs, typically 6-12 months after receiving the first pair.

The system has proved itself in terms of reliability and productivity. In October 2005 I travelled to the USA to look at the central fabrication facility and discuss the systems and procedures with the management of Amfit. This has enabled me to offer a similar service in the UK, and currently mill for users of Footfax digitizers in England and Scotland. I have been able to secure funding to be able to offer an Insole PRO® package to other podiatrists, including training, support and Footfax digitizer on a monthly fee basis with fast turnaround UK central fabrication. There will also be support by way of co-operative marketing and advertising.

In my case, a central fabrication facility in the UK would have meant a lower capital outlay and therefore less risk and a faster return than opting for the full system. According to Amfit, in the USA a figure of 100 pairs per month is the point at which owning a mill becomes more profitable than simply owning a digitizer and making use of a central fabrication facility. This would appear also to be the case in the UK, as it can take as few as three pairs per month to break even should the user rent a digitizer.

### The future

The market opportunities for a podiatrist who specialises in musculoskeletal issues must be better than at any time in the past, and the use of CAD/CAM for orthotics fabrication is more economically viable. The danger is that other professions, and even shoe shops to some extent, are seen to take the lead in providing foot orthotics in the UK. To counter the public perception that a podiatrist is simply someone to whom you turn for nail or hard skin treatments it is necessary to market oneself. My advice is choose a niche, and go for it!



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