

## Hand Made Foot Orthoses 17 Years On...

**B**io mechanics Foot Laboratory has been manufacturing custom-built foot orthoses in Ireland for nearly eighteen years, and is run by its founders, Paul Gabriel Scullion, a podiatric surgeon in Dublin, and Jane Cousins, a mechanical engineer.

'In the early 1980s, I needed a small laboratory to fulfil the needs of my own practice,' says Mr Scullion. 'However, Jane and I saw a demand for a commercial foot orthoses laboratory in Great Britain – practitioners were having to order their devices from as far afield as the US.'

Although the lab was originally based in a workshop at the bottom of the family garden, it has expanded over time to its current location in an industrial park in the suburbs of North West Dublin.

'We have always set high standards in the manufacture of our handcrafted products and we are unique in being the only laboratory within Ireland and Britain to have a mechanical engineer full time on staff,' says Mr. Scullion. 'Gone are the days when all you needed was a skilled technician and a few bags of Plaster of Paris. Today, we use unique three-dimensional laser scanning technology interfaced to robotic milling machines to assist in the timely manufacture of our orthoses.'

Much of the equipment used is custom-made for the job, including purpose-built inflation bladder presses.

These offer several advantages over the more commonly used vacuum press – namely, much higher operating pressures combined with speed and ease of use.

The inflation press action pushes the hot plastic accurately into the intrinsic prescription contours of the foot mould. This equipment makes the job a lot easier even with the latest generation tough, durable carbon fibre composite thermoplastics.

'I have been involved with a number of further education establishments in Dublin,' says Mr. Scullion. 'Several years ago, we worked with an engineering student who undertook his practical examinations by building a replica design of our custom presses. He certainly put that machine through its paces. Under experimental conditions one of our presses was inflated to over four times atmospheric pressure.

'We are aware now that our equipment can achieve pressures equivalent to some deep-sea dives, so we can be certain that the precise prescription shape of the custom mould is truly captured in our orthosis shell.'

Mr Scullion monitored further innovations within the field of podiatric biomechanics, and in particular the application of high technology to the custom manufacturing arena. 'In the mid-90s, I researched the various technologies developed for the efficient manufacture of



custom-made foot orthoses,' he explains. 'What struck me was that the new laser imaging technologies used by all the main players within the field came from one source, Dr John Bergmann, an American podiatrist.'

Dr Bergmann's unique technology uses a prism to split optical laser light that scans the human foot in three dimensions. 'The laser scan makes an exact copy of the patient's foot,' explains Mr. Scullion. 'Our CNC robotic machine then mills the equivalent of a positive plaster mould from high-grade reusable milling wax. This is a highly environmentally-friendly process. When finished, the wax is simply melted and reused.'

There are other advantages over traditional methods. 'When we began our laboratory, storing the plaster moulds was a difficulty in terms of space. Today, we store all digitised foot files indefinitely. For security we keep three duplicate libraries of these files at various locations.

'Speed is another advantage: we can instantly call up a stored prescription and remanufacture an exact reproduction of the original order, or redesign to create a new prescription where required,' explains Mr Scullion. 'Our new system is truly "custom", in that our traditional manufacturing methods have translated perfectly into the software package. We also receive periodic updates to our software where any new biomechanical innovation or manufacturing style may emerge.'

Biomechanics Foot Laboratory offers an eight working day turnaround for production of a custom-made foot orthoses. If you are interested in further information, prices or a product brochure, please contact Ms Cousins or Mr Scullion on 00 353 1 882 9399, or email: [biofoot@indigo.ie](mailto:biofoot@indigo.ie)

