

## Design, Development and Manufacturing

a report by

**Finsbury Orthopaedics Ltd**

### Introduction

Finsbury was an early university spin-off company, being formed 25 years ago in 1978. Bill Day and the current managing director, Mike Tuke, had worked in the Biomechanics Unit at Imperial College in London under Dr (later Professor) Swanson and Mr Michael Freeman FRCS, who were the co-directors of the unit; both were very inspiring and supportive in the company's development.

Finsbury was formed with capital of just £1,000 and has remained self-funded to date. Lawyers in London's Finsbury Square chose the company name; it has no other relevance. The company's original objectives of design development and manufacture of advanced joint replacements continue to this day and have resulted in a number of products being licensed to larger companies that have achieved considerable success.

In the early days, Finsbury operated from the founders' homes and from Mike Tuke's parents' house in Surrey, where a turnover in excess of £1 million in the first six years was achieved before the company moved to premises in Chessington. Bill Day left the company soon afterwards to take up property management with his new wife. Bill, sadly, died recently.

During this initial period, the 'Freeman Swanson Total Knee' system was refined into the 'Freeman Samuelson Knee' and became one of the earliest and most successful long-term total knee replacements (TKRs). It was made and marketed by Protek and later by Sulzer. The first 'Tensor' instrument for controlling the flexion-extension space in TKR was invented by Freeman and Day before the start of the company, but this device remains a strong feature of Finsbury's current knee instrumentation. The 'Tuke Saw', with its unique 'safe on soft tissue' and 'end cutting' features, was also developed in this early period for ankle and knee replacement.

### Innovation and Exploitation

A major early product developed by Finsbury was the innovative neck-retaining 'Freeman Hip Stem'

for Michael Freeman; this achieved initial success, but there were some medium-term problems without hydroxylapatite (HA) coating, which have since been eradicated.

The Freeman hip was ready for launch in 1985 and Finsbury planned to market it through its own sales and marketing operation. However, a suggestion of Peter Gibson was adopted, and Finsbury set up Corin Medical, providing 80% of the initial capital, and invited Peter Gibson to be the managing director. It was agreed that, as equal partners with Corin Medical, Finsbury would provide all research and development and instrumentation, and Corin would undertake the implant manufacture, sales and marketing. This worked well for some years, seeing a number of innovative products generated.

Finsbury designed the 'Nuffield Knee' with input from orthopaedic surgeon Mr Chris Bulstrode FRCS at the Nuffield Orthopaedic Centre in Oxford. This knee contained the unique feature of twin spherical area contact condyles in a full TKR, and patented fixation features. It followed the Freeman-Swanson and Goodfellow-O'Connor principles of large area contact to reduce ultra-high-molecular-weight polyethylene (UHMWPE) stresses. Soon after this, in 1988, Mr John Polyzoides FRCS offered his rotation and sliding meniscus idea, and Finsbury recognised the potential for combining the principles of the Nuffield knee into a new prosthesis, the 'Rotaglide Knee', making it the first total knee to optimise the stability of area contact with mobility to reduce constraint, wear and fixation stress.

Mr Derek McMinn FRCS brought a similar story of combining the two principles of metal-on-metal and hip resurfacing to the attention of Mike Tuke in 1988. It had been offered to a number of other companies, but it was Finsbury's earlier work with the Freeman Double Cup that made the idea exciting; Finsbury agreed to develop the design, then Corin manufactured the implants. Mr McMinn later withdrew his licence to manufacture his resurfacing from Corin as a result of a number of problems occurring during 1996.



Corin subsequently wanted to own the Finsbury intellectual property for the products they were marketing; hence, in 1990, in return for a secure royalty income and long-term future as partners, Finsbury agreed to transfer ownership of many of its intellectual property rights, with the exception of some patents and the Freeman hip. Not long into the 1990s, and after the re-financing of Corin, from which the shareholders took a considerable return, Finsbury found the partnership being dissolved and had to re-establish its role.

### **New Horizons**

In association with the Osaka University Medical School, Finsbury developed an even more stable and enhanced area contact mobile knee: the 'Dual Bearing Knee' ('DBK'). The DBK offers a very patella-friendly and forgiving implant that has seen five years of excellent clinical results. Again, enhancements of manufacturing technology, combined with material science and an understanding of clinical requirements, have been vital ingredients provided by Finsbury. An improved contact area, with accurate form for more than just a few degrees of flexion, are provided, together with optimised wear surfaces for the 'extra' tibia articulation, where polishing flat surfaces is difficult. In a unique wear study, each polyethylene meniscal condyle dish thickness is measured and recorded during manufacture for later evaluation in the event of retrieval.

The 'Birmingham Hip Resurfacing' ('BHR') is the result of a unique joint collaboration and development of technologies between surgeons, Midland Medical Technologies (MMT Ltd), Doncasters Centaur Precision Castings and Finsbury. Development of the manufacturing techniques has allowed Finsbury to produce the BHR to new levels of precision in metal-on-metal technology.

The production of all types of heads and cups by other manufacturers has now been seen to have considerable variation of sphericity, surface finish, clearance and metallurgy – factors that exacerbate the phenomena of 'running in' and wear rate. The development of the BHR has shown that by obtaining high-quality castings that do not require heat treatments to rectify defects and improve their properties, a metallurgy with a harder, longer-wearing surface can be produced – but not without increased production difficulty. To reduce the wear of metal-on-metal resurfacing to that of the best clinical long-term Ring hip results (less than two microns of linear wear per year) is possible, but at a cost. Thus, the successful development of a manufacturing process for the BHR has brought advantages to this implant's function and its long-term potential.

This has been particularly important for a large head and cup, metal-on-metal implant like the BHR, for which very low sphericity and surface finish can now be shown to generate considerable levels of fluid film lubrication. This undoubtedly contributes to the remarkable performance and more natural patient feel that results from the BHR manufactured by Finsbury for Midland Medical Technologies Ltd.

### **'New' but with 'History'**

The encouragement and support of Michael Freeman continues to this day, and Finsbury is now pleased to be marketing the bone-conserving 'Freeman Hip', one of the most successful stems reported, with exceptional stability and survival. The cementless 'Freeman Hip Stem' now demonstrates clinical survivorship of 100% at 10 years. Combined with a ceramic, or large cobalt chrome head and cup, it is a very attractive prosthesis for both primary and dysplastic hips.

Further development of the Freeman Samuelson Knee led to the idea of mimicking medial-centred rotation and continuous lateral patella tracking, as exhibited in the normal knee. The Finsbury 'Medial Rotation Knee' was the first of this type of TKR and has been in clinical use for eight years; it provides exceptional AP stability without the need for a conventional stabiliser mechanism and does it throughout the range of motion. Finsbury has now expanded this system to six sizes and two different femoral options.

Finsbury continues its provision of design, development and manufacture to other orthopaedic companies, but has now launched its own specialised products. These currently include the 'Freeman Hip', 'Dual Bearing Knee', 'Medial Rotation Knee', 'TMPR', upper limb implants, power tools and unique instrumentation.

Development remains a very important activity to Finsbury, with about 20% of turnover being invested in this area. The development portfolio has over 30 projects at various stages, with priorities constantly being reviewed. As a small, independent company, which is entirely self-funded, Finsbury can afford to be innovative and responsive.

### **International Growth**

Finsbury's sales operations are now highly active in the UK, France, Belgium, South Africa, Japan, Italy, the US and Germany. Sales turnover has increased substantially to over £8 million this year and is expected to grow steadily as the company sets up further direct overseas subsidiaries and launches its already established products worldwide.

## Service

With over 100 employees and the main site close to London in Leatherhead, Finsbury is well placed to develop its position as one of the UK's most innovative and progressive companies. Finsbury employees share in the goals and rewards – and agree that a business should be fun and rewarding as well as a busy place to work.

The Finsbury corporate aim is to provide service and quality in all areas, without compromise, and, while profit is essential to provide growth and advancement, the delivery of quality and customer satisfaction is more important. The immediate customer is the surgeon, who must be provided with the latest technology in implants, and especially in instrumentation to allow them to perform their jobs optimally. Healthcare is being driven to be more cost-effective in all markets, but Finsbury is not prepared to

make savings for its customers by cutting product quality. Manufacturing techniques need to be optimised to improve costs, and Finsbury will not compromise the all-important patient long-term considerations for lower prices and improved margins. To Finsbury, the ultimate customer is the patient to whom we are determined to offer the best that innovation and modern technology can provide. ■

### Contact Information

---

*Finsbury Orthopaedics Ltd  
13 Mole Business Park, Randalls Road  
Surrey KT12 0BA United Kingdom  
Tel: +44 1372 360 830  
Fax: +44 1372 360 779  
Email: [info@finsbury.org](mailto:info@finsbury.org)  
Web: <http://www.finsbury.org/>*