

Clinical engineering: experiences of a recent CEng graduate

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Ever wondered where you will end up in your career? I think for many of us, this is often the case. I was once told 'aim at nothing, hit nothing' and I've found this to be very true, not just regarding my career but in life in general. For me, in June 2010, I saw the accomplishment of one of those aims, Chartered Engineer registration. Although this aim wasn't always 'The Aim' for me in my career it has become my most significant success and a milestone well worth achieving.

My journey to Chartered Engineer is perhaps very unique to me, but will, I'm sure, resonate with many readers. It certainly isn't the most straightforward route, with its twists and turns, but I believe this has further enriched my experience as a Clinical Engineer.

IN THE BEGINNING

Long before CEng was an aspiration or career milestone I can trace its

beginnings back to the accomplishment of a series of smaller aims or stages along the way. The first significant stage in my journey started when employed as a Medical Technical Officer (Electronics) working in Radiotherapy Physics when based in Belvoir Park Hospital, Belfast. I was at this time registered with the Engineering Council as an Eng. Tech. It was while working there and as part of the Northern Ireland Regional Medical Physics Agency (NIRMPA) that I was encouraged to achieve further academic qualifications, namely a PGD/MSc. Prior to completing the MSc I moved to work in the Royal Victoria Hospital where I took up a higher grade post working in Clinical Engineering and Physiological Sciences. Here my experience working with medical devices grew to also include laboratory equipment and physiological signal data acquisition skills.

▼ **FIGURE 1 [BELOW]** Trust Chairman's Award Finalists. From left to right: Dr G. Dempsey, Mark Wilson, David Jennings and Trust Chairman Pat McCartan.

WHAT SEEMED UNENDING

In 1999 the chance to take up a Scientist post in the same department was seized, affording me the opportunity to further develop my skills and experience to eventually obtain Chartered Engineer registration. With encouragement from Dr George Dempsey CEng and working as a Clinical Engineer I undertook a competency mapping process against the requirements for HPC Clinical Scientist registration, PATR and CEng registration, all of which proved quite a revelation. It seemed my 'to do list' better resembled my weekly shopping list and all precluding any Chartered Engineer registration! Completion of my 'to do list' took longer than originally anticipated, but to cut a long story short, by 2005 I had obtained HPC registration as a Clinical Scientist and obtained my second MSc, this time in Clinical Engineering at Cardiff University. Thankfully the costs of undertaking



◀ the MSc in Cardiff were offset by provision of a small but much appreciated IPEM bursary.

TAKING RESPONSIBILITY

Seeking to move forward and finally obtain my Chartered Engineer registration I contacted the IPEM office where I received a pre-application advice pack. The pack identified the names of two IPEM CEng advisors, one of whom I needed to contact. Making contact would enable me to chat through the application process, to share my background with them and obtain advice specific to my particular circumstances. It was very helpful and reassuring for me to know that Mr Justin McCarthy CEng was one of the advisors. Given that Justin was one of my lecturers at Cardiff University he was the obvious choice to discuss my readiness for pursuing CEng. Following the standard route I was then advised to submit for recognition of my educational qualifications and a guidance document was provided by IPEM to aid me. The application for recognition required a breakdown of my educational achievements, results, duration of each module/subject in hours and the syllabus. Thankfully my application was approved and CEng Stage 1 was now ticked off my list of 'to do's'. Justin McCarthy then encouraged me to check my competencies against those listed in the Chartered Engineer guidance documentation provided by IPEM and advised that submission of an Initial Professional Development (IPD) report of 2,000 words would be expected.

My review highlighted the need to take on a greater level of responsibility in order to ensure the competencies required for Chartered Engineer were satisfied. This was then demonstrated through my appointment as Quality Manager with responsibility for the establishment of a quality management system for Clinical Engineering. Then after quite a bit of work in 2007 we obtained ISO13485 accreditation for the 'Management and Technical Servicing of Medical Devices' and more recently in 2010 we successfully extended its scope to also include design. I also took on a lead engineering scientist role with responsibility for the design and development of hardware and software which may include:

specification development, identification of functional, verification and validation requirements, design detail, design reviews, application of risk management processes and change control. As an engineer the opportunity of identifying and developing engineering solutions, according to good manufacturing practice, has personally been very rewarding. The following are examples of current design and development projects I have the privilege of being involved in:

- Telehealth dental monitoring – remote recording of physiological data within the patient's home enabling the capture of data within the patient's natural environment and providing a cost saving to the NHS. The data is analysed facilitating the identification of episodes of grinding or clenching of teeth.
- DRSS mobile workstation – a mobile retinal camera workstation for transporting and facilitating the capture of retinal images throughout clinics in Northern Ireland.
- Medical device management interface – a tool enabling healthcare staff to access medical device information pertinent to their day-to-day responsibilities, providing quick access to device inventories, loan

► **FIGURE 2 [TOP]**
Design and development project: a medical device management tool showing the main page with a menu option selected.

► **FIGURE 3 [BOTTOM]**
Design and development project: stages in the EMG signal pre-processing, bite episode identification and extraction.

management, policies, procedures and electronic forms. We recently received an award in the Trust for this project, entitled 'The users missing link', coming runners-up in the midst of tough 'clinically based' competition (figures 1–3).

NEARING THE FINISH LINE

With additional responsible experience gained and with time marching on I re-established contact with the IPEM advisors, this time with Dr Azzam Taktak CEng, who advised me to proceed with submission of my IPD report. Compiling my report for submission was without too much difficulty, the main difficulty was deciding what to omit! As a result of advice from Dr Taktak I took extra care to ensure the reviewers of my report would easily identify where my experience fulfilled the CEng competencies. My report was accepted and a date for my Professional Review to be held in London was set. Unsure of what to expect I made my way to London on a hot day at the end of June 2010, the same day as one of England's World Cup football matches. I forget who they were playing and the result, perhaps better that way! The Professional Review was to my relief, despite having been told so, largely based on what I had submitted in my IPD report with only a couple of quite thought-provoking side winder missiles. Following the Professional Review I had to wait for word of the outcome as the Professional Review panel's recommendation still required Engineering Board approval before I could be informed. Thankfully I received official word of my success 2 weeks later and the rest as they say is history.

Having Chartered Engineer registration has provided me with a level of confidence and it is with pride that I can use the post nominal 'CEng' after my name when communicating with fellow healthcare professionals. For me the process with all its stages in obtaining the required level of knowledge, skills and responsibility has been very rewarding despite the time taken to do so. The challenge is to maintain this level of professionalism and continue to develop myself in order to identify and apply engineering solutions that are innovative and capable of harnessing ongoing technological advances. ■



medical device management interface



- HOME
- MEDICAL DEVICE MANAGEMENT
- CONTRACT MANAGEMENT
- ECRI-AIMS
- REPORT AN EQUIPMENT FAULT
- ADMINISTRATION
- LOGOUT

Welcome to the medical device management interface tool

- DEVICE INVENTORY
- GETTING A NEW MEDICAL DEVICE
- USING A MEDICAL DEVICE
- DECONTAMINATION
- MEDICAL DEVICES ON LOAN
- MEDICAL DEVICES TRANSFER/DISPOSAL
- MEDICAL DEVICE VIGILANCE



The information on this interface is based on the [Trust's Medical Device Management Policy and Guidelines](#) and is designed to aid those with responsibility for medical devices. The interface is also a good resource linking the user to medical device forms and procedures.

As the interface also accesses information stored on the Trust's Medical Device Management Database (ECRI-AIMS) users can view information relating to their equipment. This includes equipment/device search tool, inventory downloads, reporting of equipment faults, managing equipment loans, electronic registration of new equipment and notification of disposal of equipment/devices.

Note: Users should be reminded that the current data extracted from the Trust Medical Device Management Database is dependent upon devices being registered on the system.

The Contract Management section is specifically for the use of those having responsibility for contracts within the Belfast Trust i.e. Estates.

QUICK LINKS

- [Look up a Device on AIMS](#)
- [Register a New Device](#)
- [Device Booking](#)
- [Device Transfer/Disposal](#)
- [Contract Management Tools](#)
- [Medical Device Forms](#)

SECOND THOUGHTS

Not TOO MUCH and not TOO LITTLE!

Over-infusion due to user not checking that the user's instructions were for the pump in use. A user followed the instructions in the quick reference guide for a particular pump which resulted in an over-infusion of heparin. The quick reference guide attached to the pump was for the wrong model. The user should have noted that these instructions

Medical Device Alerts

