

Engineering Practice Report

For Consideration of CEng Status

Introduction/Professional Background

In my current role, I am professionally and managerially responsible for the delivery of Works & Estates Services in a major NHS Health Board. The Health Board provides acute, mental health and community services to a population base of 600,000. The Health Board has an extensive portfolio of complex building engineering services ranging from acute District General Hospitals through to community premises, with services being provided from in excess of 70 premises. I currently manage revenue budget of £2.5 million pounds and have 120 directly employed staff across all disciplines from trade staff to professional and technical staff.

My career has been based on progressive advancement by undertaking a range of different posts in order to gain the relevant experience needed for my current role. This has been supported by a commitment to continual learning and education. The progressive nature of my career has always benefited from the application of experience and knowledge to all of the posts that I have been in throughout my career. I also lead on Competent Persons (CP) training and standardisation across the department.

My role has allowed me to practice leadership in new technology and I am the lead Authorised Person (AP) for medical gas, low voltage and ventilation. This position requires mentoring and training Estate Officers to fulfil their AP roles and allows standardisation across the department. I have also developed toolbox talk presentations that I deliver to competent persons on a regular basis.

I have been responsible for personally implementing and leading in the significant application of new technologies throughout my career and continue to do so. My engineering skills have continued to be applied in my various job roles and continue to prove invaluable, particularly in the direct participation of addressing engineering problems and the application of technology in respect of major and minor projects and on-going development of best practice on maintaining the complex building services within hospitals. This supports my approach of leading by example, which I believe to be important in the management and development of professional and technical staff, particularly in providing a sound analytical approach to the ever recurring need for problem solving in my current job. A job which proves ever challenging but immensely interesting and rewarding, particularly in respect of managing ever increasing demands with limited resources.

My role within the department has ranged from operational management, management of resources, both staff and financial, minor works, energy, and new builds. This has been supported by my continual academic progression, where I have successfully completed a BSc Hons in Building Services Engineering and an MSc in Building Services Engineering.

My Commitment to raising the profile of professional engineers and related skills is evident from the continual initiatives that I have implemented for the training and development of staff for which I am responsible. My current role requires that I continue to apply my personal skills, knowledge and experience as an engineer. This ensures that I am able to lead in the continual process of seeking constant improvement and the application of technology.

Engineering Practice Report

In support of my application for Chartered Engineer, please find an account of my career history relating to the projects I have undertaken, which I feel meet the requirements of the UK Standards, demonstrating professional engineering competence.

Career Episode	UK-SPEC Standard
<p>Project No 1</p> <p>Responsible Senior Estate Officer - Maintenance and Operations Manager [REDACTED]</p> <p>Key data:</p> <p>3 Hospitals (1119 Beds and 128,713 Sq Mts) 24 Community Premises (18,070 Sq Mts) 3 Professional and Technical Staff 5 Supervisors 100 Trade Staff £2.5M Budgetary Responsibility</p> <p>[REDACTED] 1997 to date</p> <p>My role as Senior Estate Officer with overall responsibility for Maintenance and Operations, within this period has required me to develop personnel and management skills associated with undertaking a demanding role and requirement to develop a diverse team across multiple skill ranges. Much of the early work involved me developing robust Continuous Professional Development (CPD) for my direct report team. I was also required to agree and develop a personal CPD direct with the Head of Works and Estates (HWE), to ensure continual learning and progression; an example being the requirement to formalise line managers reporting processes and a move out of the shared office environment to a separate office. This facilitated a more professional line management arrangement whilst facilitating line managers taking more direct responsibility in their roles.</p> <p>During this period I have been responsible for many changes and implementation of revised service models to meet changing user expectations, such as the introduction of 24 hour shift working. I continue to take an active leadership role providing the necessary support to my line managers on a routine basis. Their CPD enables me to develop them in areas of weakness.</p> <p>My personal CPD agreed with the HWE has enabled a focus on areas for development. A particular commitment to continual learning and experience being the benefits gained from the enhanced skills acquired as a result of my professional qualifications and education process over recent years.</p>	<p>A2</p> <p>B1</p> <p>C1</p> <p>C2</p> <p>C3</p> <p>D1</p>

In terms of professional management challenges and skills, I list below areas I have been responsible for, acknowledging this list is far from exhaustive.

1 Workforce modelling

I was given the task of scoping the department in relation to the workforce needs and then modelling the workforce to accommodate service needs, not only for existing hospitals but also two new hospitals that were due for completion. [REDACTED]

[REDACTED]. During this review I was tasked with assessing the required competency and grades that would be required to deliver a safe and reliable service. This was undertaken with full union and staff representation into the process in recognition of the sensitive nature of this work in terms of potential impact on staff numbers and skill mix (bandings).

2 On-call

As a senior manager I participate in an on-call rota for [REDACTED], which requires me to be responsible for all Estates services out of hours.

3 Changes to bandings

I am at present assessing pay bands in accordance with the service model required. This is being conducted as a task and finish group (which I chair) to deliver a satisfactory service, this is currently ongoing and I am responsible for reporting directly to the head of Works and Estates for approval.

4 Budget management

Within this role I am responsible for budget management, both staff and non staff and I am required to make efficiency savings related to both, in a time of ever depleting resources, which is continuing to prove challenging.

D3

E4

Career Episode	UK-SPEC Standard
<p>Project No 2</p> <p>Estate Infrastructure Work at [REDACTED] Hospital</p> <p>[REDACTED] 2009 – To Date</p> <p>The Health Board is currently implementing the clinical futures service model, which will provide a Specialist Critical Care Centre (SCCC) and also provide a major reconfiguration of the [REDACTED] to become a local General Hospital. This required me to adopt an in depth risk based approach to the infrastructure requirements, to ensure that the [REDACTED] Hospital maintained services for the interim period (10yrs) as indicated within the survival plan.</p> <p>As senior Estates Manager for [REDACTED], I was tasked with producing an in-depth report detailing the requirements for the [REDACTED] hospitals as part of the survival plan, whilst new hospitals were being designed. This I found to be a challenging role, as the re-provision of the essential infrastructure services had to be evaluated and critically risk assessed in order to produce a prioritised list. It was decided by the Health Board that the process should follow the Design for Life framework.</p> <p>Originally, a project was agreed with the Welsh Assembly Government to deliver a sixteen million pound solution. However, this was reduced to eight million. I was responsible for prioritising and evaluating the original programme. This I based on risk associated with the delivery of service. I am responsible for fulfilling the project management role within this project, working directly with the head of Works and Estates (the project director). During this period, I was also required to retain responsibility for my operations and maintenance role. To facilitate this, I developed robust plans to ensure my line management Estates Officers and Supervisors fulfilled additional duties and responsibilities to enable me to release sufficient time to fulfil this role. I was responsible for arranging meetings with Welsh Health Estates and interviewing the framework consultants. This role involved me becoming exposed to major contractual management on a large contractor delivering a complex scheme, as in this role I have responsibility for delivery of the scheme to cost and time whilst retaining operational site responsibility for day to day running. This presented new challenges, particularly in the practical application of complex work balanced with the reality and constraints of delivery in an occupied building on operational services and infrastructure.</p> <p>During this period I was acting as principal engineer for the project. This has probably been the most challenging and demanding of all the projects that I have undertaken to date. The infrastructure replacement project involves the following:</p> <ol style="list-style-type: none"> 1. Replacement of 2 No ultra clean ventilation canopies for Orthopaedic Theatres. 	<p>B1</p> <p>B2</p> <p>C1 C2 C3</p> <p>D2 D3</p> <p>Cont'd.....</p> <p>D1</p> <p>B1 B3 E1</p>

<p>2. Replacement of the low voltage panel supplying the [REDACTED] Hospital.</p> <p>3. Replacement of 2 No air handling units for Gynaecology Theatres.</p> <p>4. Replacement of the air handling units for 2 No Endoscopy Theatres.</p> <p>5. New water main for the whole hospital.</p> <p>6. Re-provision of waste services (internal drainage).</p> <p>7. Replacement of 6 No bed lifts.</p> <p>8. Refurbishment of sub distribution electrical services, to include emergency lighting inverter control and high efficiency lighting.</p>	
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Career Episode	UK-SPEC Standard
<p>Project No 3</p> <p>Replacement of the Main LV Panel at the [REDACTED] Hospital</p> <p>£1.6M Project Main panel comprising 30 Air Circuit Breakers (ACB's) 4 generator changeover panel Installation of 2 number replacement LV panels Installation of Power Factors (PF) Load profiling of existing loads to enable redistribution to present balanced loads Extensive testing and field switching on more than 30 complex shutdowns.</p> <p><u>[REDACTED] 2011</u></p> <p>As Principle Engineer for the infrastructure project, I have the responsibility of replacing the main Low Voltage (LV) Panel supplying the [REDACTED] Hospital. My role was project manager and I was responsible for validating the design and arranging the complex shutdowns to the hospital to enable this project to be undertaken. The project involved isolation of electrical services to the entire hospital on a phased approach. I challenged the design submitted by the consultants and influenced a more innovative proposal which incorporated BUS couplers to switch between essential and non-essential supplies. My recommendation was also to design a generator changeover panel which allowed all four generators on site to be switched to take the duty of each other. I also introduced, within the panel a spare switch to allow load bank testing/connection of a temporary generator, with no disruption to the electrical services.</p> <p>I also reviewed the design proposal and recommended a change that enabled a switch room with associated foundation works to be resolved by locating the changeover panel into an existing switch room. This also required some redistribution of loads but the significant savings generated enabled further system resilience enhancements with the replacement of 2 additional panels within the project cost.</p> <p>Prior to any work on site, I had to simulate all shutdowns required, which involved the operation of switching a complex sequence by an LV panel that was in excess of thirty years old.</p> <p>It was my duty and responsibility to co-ordinate the interruption of services with all involved. During this process, I arranged temporary electrical services (including standby temporary generators), to facilitate the continuity and delivery of patient care including critical care and theatre departments. Following completion of this project, I was responsible for training authorised persons LV into the safe and correct operation of the system.</p>	<p>A1</p> <p>A2</p> <p>C1 C2 C3</p> <p>B1 B3</p> <p>D1</p> <p>E1 E2</p> <p>E3</p>

Career Episode	UK-SPEC Standard
<p>Project No 4</p> <p>Medical Gas Supply and Commissioning at [REDACTED]</p> <p>300 bed single room hospital £140M Works Cost contract 3 year build Theatres, MRI, CT associated with acute services.</p> <p><u>[REDACTED] 2009 - 2011</u></p> <p>[REDACTED] are two new hospitals that have been built as part of the clinical futures program. As Senior Authorised person for medical gas, I was responsible for influencing and validating the design proposal for both hospitals. My role was to evaluate the design and to sign off the final proposal for the installation of medical gases of both hospitals. During the design, I requested that there be two separate entries into the building, to provide additional resilience, whilst acknowledging that this is over and above the Health Technical Memorandum (HTM) requirement. This design change was adopted.</p> <p>I was also responsible for ensuring that the proposals met both the requirements of the Health Board and those set out by HTM 02-01. I was responsible for signing derogations and accepting design alternatives. This included derogating away from the guidance of one duct with removable covers to providing two separate ducts with removable covers.</p> <p>I had to understand the overall construction programme as commissioning of medical gases had the potential to delay the opening of the hospital. This required me to not only understand the contractual pressures and obligation but also to convey to the Contractor my requirements in terms of a safe commissioning process that also involved other professional disciplines (quality pharmacist). During the programme discussions, it was clear that the limited timetable and float available required some alternative actions as I had booked leave during what would be a critical period. I therefore undertook a site familiarisation programme of other AP's who then covered my 2 week leave period to maintain the programme.</p> <p>Throughout the construction phase, I chaired all meetings in relation to medical gases, which included hospital consultants, anaesthetists, supply chain partners and end users. Following the acceptance of design and on completion of installation, I was responsible for testing and commissioning the entire installation. I was required to sign off acceptance on behalf of the Health Board as fit for patient use. Following this process as senior AP for the Board, I implemented a permit to work system whilst the supply chain partner was still on site (and in control which was not the norm). This procedure was accepted. I was also responsible for training the Estates Maintenance team with</p>	<p>A1</p> <p>B3</p> <p>D1</p> <p>E1</p> <p>E2</p>

<p>regard to planned preventative maintenance and installation familiarisation in the tasks that would need to be undertaken. I am currently performing an audit role to ensure that the provision of medical gas within both hospitals is maintained as set out in HTM-02-01.</p> <p>Following completion it was evident that corrosion of the underground pipe work was evident due to calcium deposits forming on the main piped oxygen. This was addressed by replacing the whole external installation and introducing a shield for protection. Following this, guidance notes have been produced regarding protection of external pipes via an Estates and Facilities alert.</p>	<p>C1</p> <p>C2</p>
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Career Episode	UK-SPEC Standard
<p>Project No 5</p> <p>Pseudomonas Within the Intensive Care Unit at the [REDACTED] Hospital</p> <p>[REDACTED] 2010</p> <p>Following refurbishment and upgrading of the Intensive Care Unit (ICU) at the [REDACTED] Hospital, increased incidence of the Multi-drug Resistant Pseudomonas (MRP) (resistant to 3 or more anti-pseudomonal antibiotics) was noted in clinical samples of 10 patients, between November 2009 and March 2010. I conducted extensive sampling of the ICU environment and could identify no likely source. However, the tap water from the sinks yielded high (>300cfu/100ml) colony counts of MRP from all samples that I tested. the magnitude and complexity of this problem required me to be very structured in a problem solving approach, detail had to be given to the following</p> <ol style="list-style-type: none"> 1. Concise pipe work checks in relation to the existing installation. 2. Testing and cleaning of tank water supplies. 3. The specification had to be checked for chlorination and test certificates following handover. <p>Prior to progressing, there were several constraints associated with keeping open and fully operational a 14 bed ICU unit. I took an active role in resolving conflict between the Infection Prevention and Control (IPAC) team and ICU consultants. Whilst both had the interest of the patient in mind, they presented different needs. The medical team driver being to reflect risk as part of a multiple acuity condition that moving the patient would present considerable risk. The IPAC driver being the mitigation and removal of the infection risk of Pseudomonas.</p> <p>Following the above checks, it became apparent to me that the problem was within the Intensive Care Unit and therefore further investigation would be required.</p> <p>Further sampling at various points in the supply pipe work localised the likely source to thermal mixer units in newly installed sensor taps. I decided to change two sensor mixer taps in the ICU and replace them with conventional elbow operated mixer taps and repeat sampling from these conventional mixer taps showed no MRP. Testing of the reservoir within the sensor mixer taps which were removed initially also yielded a high count of MRP.</p> <p>In March 2010, all the ICU sensor taps were replaced by conventional mixer taps. Repeat testing of water from the replacement taps showed no evidence of MRP. No further cases of infection/colonisation with MRP have occurred. The water sampling is continuing on a monthly basis now.</p>	<p>A1</p> <p>B2</p> <p>B3</p> <p>Cont'd.....</p>

<p>Variable Number of Tandem Repeats (VNTR) typing by Colindale demonstrated the same strain of MRP in 6 patients, a different strain shared by 2 other patients and 2 patients had distinct strains. Isolates from tap water were of 3 different VNTR types, two of which matched with patient's strains except one which had a unique strain.</p> <p>There is no national guidance requiring testing of water for <i>Pseudomonas Aeruginosa</i> in hospitals and no published standard for acceptable counts for <i>Pseudomonas Aeruginosa</i> in hospital water. As testing of tap water is not routine, it is unknown, whether MRP was already present in the water supply in small numbers and usually not clinically significant. The sensor mixer tap with its internal configuration and reservoir may have contributed to multiplication of initial low number of organisms.</p> <p>Following this outbreak, I met with the tap manufacturer and discussed my findings. As a result of my investigations, the tap manufacturer has subsequently removed the reservoir which caused the problem and designed a new tap configuration with an attempt to design out this problem.</p> <p>As a direct result of this, I was required to attend several meetings across the country to present my findings to a wider audience and I am now an active member of the National Working Party selected to address this problem for both England and Wales.</p> <p>To date, I continue to influence guidance on this subject and it is likely that national guidance will be published in the near future.</p> <p>By way of continuous learning, I also took the opportunity to review major works on the water system and developed a policy and action plan to address interruption to water systems for future guidance.</p>	<p>A2</p> <p>D1 D2</p>
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Career Episode	UK-SPEC Standard
<p>Project No 6</p> <p>Development and adoption of Medical Gas Policy</p> <p>██████████ 2010</p> <p>As a senior authorized person for medical gas and recently appointed acting authorising engineer for ██████, I was given the task of developing and implementing a medical gas policy for ██████. This was particularly challenging as there are very few health authorities that have a policy in place that has been adopted and accepted by the authority/board.</p> <p>I wrote a medical gas policy based on the requirements set out by HTM 02-01 in conjunction with health care professionals, who included Microbiology, Pharmacy and Anaesthetics and this policy has been adopted as an official health board policy. Following acceptance, I wrote site specific policies for all sites within ██████ that have piped medical gas. The challenges I faced during this process was that the Health Board were reluctant to adopt the policy I wrote due to the cost/practicality for nurse and porter training.</p> <p>Following some intense meetings that I chaired, I decided to inform the Health Board that a medical gas committee would need to be set up with representation from senior management, Anaesthetics, Facilities, Pharmacy and Estates. This meeting was chaired by myself and following consultation, the Health Board adopted the policy I proposed.</p> <p>Once the policy had been adopted it was decided by the committee that I would conduct porter training and arrange the necessary training for nursing staff to enable compliance with the policy.</p>	<p>D1</p> <p>D2</p> <p>D3</p> <p>E1 E2</p> <p>E4</p>

Career Episode	UK-SPEC Standard
<p>Project. No 7</p> <p>The Installation of an additional VIE at the [REDACTED] Hospital to improve resilience and meet the requirements of HTM 02-01</p> <p><u>[REDACTED] 2004</u></p> <p>My Senior Engineering role within [REDACTED] NHS Trust enabled me to take the lead role in the detailed design and installation of a new Vacuum Insulated Evaporator (VIE) at the [REDACTED] Hospital.</p> <p>I was tasked with designing a system that would provide maximum flexibility and resilience with regard to delivering a safe and secure supply of oxygen. The [REDACTED] Hospital is an 850 bed district general and is supplied with oxygen via a sister hospital, [REDACTED]. This supply is via an underground duct which is approximately 0.8 kilometres from the [REDACTED] Hospital. My design had to ensure that a VIE was installed on both sites and that any failure of the network between them would enable both hospitals to become self-sufficient. My brief was also to design a system to allow either hospital to be supplied with oxygen from either VIE.</p> <p>The design process for this project was quite intense and complex due to the number of interested parties. The proposal I put forward required detailed and lengthy negotiations and formal approval from BOC prior to being accepted. As this design linked two VIE compounds controlled via a network of pressure differential switches, my proposal ensured that failure of either would result in critical services being maintained. I chaired the design team meetings which involved consultants, nurse and senior managers responsible for the safe delivery of patient care. The design proposal that I put forward was adopted. During this process, I chaired contract meetings throughout the process. Following the acceptance of design, it was my responsibility to co-ordinate the installations and plant, and the necessary oxygen isolations that would be required.</p> <p>As senior authorised person for medical gas for [REDACTED], I arranged the necessary requirements for the installation to take place. This involved making provision for all patients oxygen dependant, to be supplied by alternative methods. Following completion of the installation, I was responsible for liaising with the quality control pharmacist and carrying out all tests as set out by HTM 02-01. The design that I proposed and implemented for this has been recognised and adopted by both BOC and the medical gas installer and is now used as a standard approach to provide a resilient supply of oxygen.</p>	<p>A1 A2</p> <p>D1 D2</p> <p>C1 B3</p> <p>C3</p> <p>E1 E2</p>

Career Episode	UK-SPEC Standard
<p>Project No 8</p> <p>Private Finance Initiative (Energy Re-provision [REDACTED] Hospital)</p> <p>[REDACTED] NHS trust 1998 – 2000</p> <p>As project manager for [REDACTED] NHS trust, I provided engineering input into re-providing significant parts of the energy infrastructure for the [REDACTED] hospitals. This was carried out via a private finance initiative and the overall contract value was 4.6 million. This was an innovative procurement process, where the project resulted in guaranteed savings on the outlay of capital investment. The project required me to identify baseline energy consumption and validate energy performance against this.</p> <p>The project involved replacement boiler plants, combined heat and power, new energy efficient lighting, water saving devices and the installation of an extensive building energy management system. The project team consisted of Procurement, Finance, Works and Estates and Legal Services. My role as senior mechanical engineer meant that I was responsible for evaluating tenders and validating design briefs prior to the awards of contract. I was responsible for chairing contract meetings, liaising and supporting the Finance Department with energy consumption data and proposed savings and solutions.</p> <p>Following the award of contract, I was responsible for carrying out the site engineer role, ensuring that design criteria and statutory codes such as HTM and Health Building Notes (HBN's) were followed. I also acted as site liaison officer ensuring smooth installation with the minimum of disruption. During the contract negotiations I decided that the Trust should install a building energy management system to assist in cost reduction. The energy management system consisted of individual room control, targeting and monitoring software and all associated plant controls.</p> <p>My role was to manage and co-ordinate the installation of this system and to validate and sign off acceptance on behalf of the trust following practical completion. Following completion of this project, I was responsible for completing quarterly energy consumption reports for the head of Works and Estates and I participated in ongoing energy reduction initiatives.</p>	<p>A1 A2</p> <p>B1</p> <p>D1 D2</p> <p>B3</p> <p>E3</p> <p>C1</p> <p>E2</p> <p>C4</p>