Competence Profiles – Guidance for applicants and Assessors

PART 2 – INDUSTRY CLASSIFICATION (L) – TELECOMMUNICATIONS

Introduction

Although mechanical engineers are typically in a minority in the telecommunications industry, they could be involved in a wide range of tasks requiring a professional (i.e. Chartered) level of competence. They are likely to have to work closely with other professionals, especially electrical and telecommunications engineers.

The industry has undergone sweeping changes in recent years. These are due partly to privatisation and the emergence of new companies and partly to the dramatic technological developments that have affected all sectors of the business. Whereas the engineering capability of the industry was previously represented mainly by the various branches of Post Office Telecommunications (later, British Telecom and then BT) and its contractors and equipment suppliers, there now exists a plethora of manufacturing companies involved in RF, hardware and software engineering, mechanical and electrical design (e.g. printed circuit boards), product system design, manufacture and verification, field trialling of new products in various countries and product maintenance. This applies to fixed telephone networks and to mobile and portable telephone products (handsets, terrestrial and satellite base stations, etc.).

On the operations side of the industry, in addition to British Telecom which provides both fixed and cellular telephone facilities, a number of independent service providers have entered the market, operating alongside (and usually in competition with) BT. These include, for example, NTL, VarTec, One 2 One, Vodafone and Orange. With the advent of enhanced customer applications such as ISDN, mobile phone Internet access, wireless networking and BT Openworld's ADSL service, the interfaces between telephone engineering, broadcasting technology and IT are becoming increasingly blurred, making the assessment of individual professional engineering responsibilities within the industry ever more complex.

In the case of the new "multi-utility" companies providing several services, e.g. water, gas, electricity and even domestic appliances in addition to telephone facilities, engineers may be responsible for the operation and/or maintenance of equipment covering both mechanical and electrical aspects. Such cases need to be carefully assessed on the basis of an applicant's individual duties and authority. Information from MPDS and company development schemes may assist in this area.

In order to assess professional engineering responsibilities against such a varied and changing background, it is now necessary to judge an individual's competences, as distinct from investigating time spent in designated posts previously deemed to meet the Institution's requirements for Membership. The method of assessing the various elements of competence within sections A to E, in accordance with the benchmark profile for Membership (normally a minimum of three sections at level 3 plus two sections at level 2), is fully described in Part 1 of this manual.

Requirements for election or transfer to Member

Manufacturing organisations

The structure of a typical, modern telecommunications manufacturing company is likely to comprise all or most of the following functions:

Research, Development & Design	Manufacture & Production	Human Resources	Finance & Procurement
RF	Test development		
Product Systems	Surface Mount Assembly		
Software	Verification		
Hardware	Automation		
Technology (environment,	Problem solving,		

statutory regulations, etc.)	investigations consultancy	and

Of these functions, all except HR and Finance & Procurement are likely to incorporate a significant engineering content; mechanical engineers designated as Team Leaders within some or all of those functions may be expected to fulfil the Institution's requirements for the class of Member

Operating companies and service providers

The reorganisations and restructuring of British Telecom (BT) in recent years, together with the appearance of new, independent telephone operating companies, make it impossible to give clear guidelines in terms of grades and job titles - for example, someone in BT with the title of 'Manager' may have a job of low responsibility and authority, whereas another 'manager' may have responsibilities appropriate to the grade of Member, or even that of Fellow.

Where an applicant has been with a company such as BT for many years, former grades that he or she may have held could provide useful guidance. For example, Executive Engineers or above would normally have been considered for Member, but Assistant Executive Engineers would have been considered only exceptionally. The grades of Head of Division, Head of Section and Head of Branch within headquarters departments such as research, development, engineering safety or quality assurance may well have satisfied the requirements for Fellow, while Head of Group could have satisfied Member requirements.

Even bearing in mind these past grades, however, it must be emphasised that most BT staff will have experienced a considerable change in function with reorganisation; and assessment on their present functions must dominate. Heavy reduction in staff numbers and considerable redeployment is likely to have placed many individuals in a function with no real contact with their academic qualifications or former engineering experience; in such cases the review interview will be particularly important. As a guide, the following types of activity may give suitable opportunities for mechanical engineers on the operations side of the industry to exercise and demonstrate a professional level of competence:

- Cables & cabling – cable specification, design of cable jointing systems for both copper and optical fibre cables. Design and specification of specialised cabling vehicles and winches. Design of cable ducts, cable tunnels, works practices (safety in respect of gas or foul air or other pollutants).
- Submarine cables – cable ship equipment, design and specification of deep-sea cable joints, cable recovery & repair techniques.
- Overhead construction – mechanical aids, tools, safety practices for poling, overhead cabling and wiring.
- Radio masts and towers – structural specification and design.
- Large steerable earth station aerials for satellite communication – specification, specialist inspection, problem solving.

  NB. The last two items may require liaison with civil and structural engineers, and with the Meteorological Office to establish, for example, design criteria in respect of wind loading.

Assessment of Competences

Professional mechanical engineering responsibilities for the positions described above will, of course, depend to a large extent on the particular company and location, the type of equipment being manufactured or utilised and the individual's job description. This reinforces the importance of carefully assessing applicants' personal responsibilities and competences, together with their direct input to projects in their work area and their degree of supervision. In addition, clear and comprehensive organisation charts will be key to the appraisal process. **It will no longer be appropriate to recommend election to Member on the basis of job title or grade.**

Where an applicant appears to spend the **majority** of his time in project engineering or project management, assessors may find it helpful to refer to the section entitled "Engineers in Project Management Rôles" which appears later in Part 2 of this manual.

Competence statements A and B

Successful applicants will be able to demonstrate their use of a combination of general and specialist engineering knowledge and understanding to optimise the application of existing and emerging technology in their chosen field within the telecommunications industry, be it in design, manufacture, operations, maintenance, research and development, engineering services or any of the other areas outlined above.

Applicants engaged primarily in project engineering or management should provide, and assessors should seek, evidence of responsibility for technical specifications, technical risk management, evaluation of technical solutions and monitoring against technical performance standards.

Examples of situations or activities that may give mechanical engineers the opportunity to achieve and demonstrate professional competence in these areas include:

- The introduction of new products and carrying out feasibility studies following the design concept stage, e.g. new materials, packaging (i.e. encapsulation) techniques, power supplies.
- The patenting of such products and processes.
- Participation in joint research with universities and research associations on, for example, environmental issues, new materials, etc. This would include secondments between parent companies and other commercial organisations.
- The evaluation, including Failure Mode & Effect Analysis (FMEA) studies, of new concepts for application in the telecommunications industry, e.g. conformable batteries, internal antennae, WAP technology, novel displays.
- Membership of multidisciplinary project teams using Design For Manufacture/Design For Assembly (DFM/DFA) techniques to achieve technical and commercial targets.

Where, because of the diversity of services offered by their employer, applicants work in areas of engineering other than telecommunications, their technical competence may be better judged by reference to the appropriate section of this manual, e.g. the electrical power industry.

Competence statement C

As many companies now operate a matrix management structure, applicants are not necessarily expected to have line management responsibility or experience in order to meet the required level of competence in this section. Also, engineers who have moved into highly specialist technical rôles, e.g. in headquarters engineering departments and in equipment manufacturing companies, may have minimal management responsibilities; such applicants would be expected to have a high degree of autonomy in planning and monitoring their activities and care should be taken to explore the interface between them and their colleagues and supervisors.

Examples of situations or activities that may give engineers the opportunity to achieve and demonstrate competence in these areas include:

- Active participation in post-FMEA design reviews and time-to-market milestone reviews of product mechanical design.
- The identification of training requirements for team members, to enhance their relevant skills; and the implementation of such training.
- Day-to-day review of those components of quality management systems relevant to the applicant's own field of work.

Competence statement D

Communication and interpersonal skills should be assessed by consideration of both the Professional Review Report and interview performance. Assessors should look out for a report which has a logical structure, clearly aimed at providing a portfolio of evidence against each of the five competence statements, while providing a qualitative description of activities and achievements.

Assessment of verbal communication skills should analyse the ability to give clear, concise and relevant answers that address the question without undue digression and provide sufficient, but not superfluous detail.

Additional evidence of competence in this area may be sought by investigating:

- Whether the applicant routinely makes presentations to technical and non-technical in-house staff at various levels, outside clients and contractors; subjects could include project plans, business plans, etc.
- Whether the applicant is involved in commercial and technical negotiations with component suppliers, contractors, etc.
- Any involvement in representational duties, e.g. staff councils, safety committees, staff appraisal, etc.

Competence statement E

The [establishment and] observance of safe working procedures, including compliance with internal, national and international codes of practice, is inherent in virtually all engineering activities in the telecommunications industry. Similarly, there are codes that cover the design and manufacture of equipment; applicants should be able to show their commitment to observing and promoting the use of any such codes that are relevant. In particular, they should be able to demonstrate familiarity with the Radio Equipment and Telecommunications Terminal Equipment (R&TTE) Directive in terms of:

- Understanding their own rôle
- Knowledge of electromagnetic emissions legislation
- Understanding the entire manufacturing process and its impact on the product (environmental, disposal, etc.)
- Knowledge of error correction procedures

Evidence of professional integrity and commitment should include a Self-Development Action Plan, in any convenient format, outlining how the applicant intends to maintain and enhance competence through personal development. The Plan should include short, medium and long-term goals and explain how these are likely to be achieved. Assessors should be aware that SARTOR 3 interprets Continuing Professional Development (CPD) as commencing at the point where Chartered status is attained; therefore applicants are not required to provide a record of courses attended, etc., when applying for corporate membership.

Examples of CPD activities recognised by the Institution as acceptable include:

- extra qualifications such as an MBA, Diploma in Engineering Management
- any relevant technical or business courses
- conducting or attending workshops
- attending, presenting or participating in seminars and conferences
- presenting or attending lectures
- writing technical papers
- reading technical articles and journals
- distance or open learning
- secondments and job rotation
- hosting visits from schools, colleges, etc.
- updating in own and other fields of work
- Institution meetings or events
- active IMechE committee work
- learning a foreign language
- involvement in government activities

- community and charity work

Requirements for election or transfer to Fellow

The following senior engineering posts within a manufacturing company should be considered as generally likely to meet the requirements for the class of Fellow:

Director

Product Manager

Group Leader with 5 or more years' seniority

Applicants will generally have significant responsibilities for resources (both financial and manpower) and also have wide understanding of strategic, commercial and financial issues. They are likely to be experts in their particular fields, e.g. project management, radio-frequency technology or operating software, and "champions" for their directorate, company or industry sector.

Valid applications for election or transfer to Fellow may be received from other engineers with established reputations in important positions of responsibility in engineering science or practice. This applies to engineers both in manufacturing companies and with service providers. In addition to demonstration of achievements and standing in their field of engineering science or practice, applicants would be expected to participate in external forums, for example by promoting the importance of engineering issues in debate with Government and other bodies, via the Institution. In any case, an involvement in the professional development of young engineers would be expected, as would documentary evidence of Continuing Professional Development.

Further examples of suitable CPD activities not covered under the requirement for Competence Statement E above include:

- MPDS mentoring
- Acting as an IMechE Membership Panel interviewer

For candidates applying directly for the class of Fellow, a Professional Review Report similar to that required for the class of Member would be required in addition to an interview. In particular, this report must contain additional supporting evidence detailing:

- The position of senior engineering responsibility held by the applicant
- The applicant's contribution to the professional development of young engineers
- How the applicant intends to keep up to date regarding developing technologies, from both a technical and a commercial standpoint.

Finally, a Development Action Plan detailing a future programme of CPD would be required from applicants in either category (transfer from Member or direct election).