

Competence Profiles – Guidance for applicants and Assessors

PART 2 – INDUSTRY CLASSIFICATION (F) – POWER GENERATION – NON-NUCLEAR

Introduction

Since privatisation of the Electricity Supply Industry, the standard gradings and salary scales previously used by the Electricity Council, CEGB and Area Boards have totally disappeared and their use as broad indicators of professional engineering responsibility is no longer relevant. A number of independent generating companies have entered the market, operating alongside those formed by the break-up of the CEGB, all administering their own organisations and salary structures. While these may take account of competitors' arrangements, there is no standard basis for comparison.

In addition, technological and commercial factors have resulted in sweeping changes to generation and power station concepts. The introduction of significant numbers of gas-fired power plants coupled with combined cycle technology have changed the layout and organisation of generating stations. The previous quest for increased size and efficiency of traditional coal-fired and oil-fired steam plant has given way to the use of flexible, combined gas and steam turbine (CCGT) units. These, in turn, have further improved cycle thermal efficiency.

As a rough guide, the level of professional engineering responsibility previously associated with posts in a conventional 2000+MW steam station (4 x 500MW or 660MW units) can now be related to those in a 1400MW CCGT station including a number of steam and gas turbines of varying size. The latter station will be operating in a commercially exacting regime with attendant implications for plant performance (efficiency, flexibility and reliability).

In response to financial and regulatory pressures, all companies have introduced flat management structures; corporate headquarters and specialist support functions have been slimmed down; Deputy Station Manager and Research Officer posts have disappeared; and an increasing amount of engineering work is undertaken on a project basis by individual power stations. This has resulted in relatively junior engineers taking on professional responsibility rather earlier than previously. In addition, supporting rôles traditionally carried out by such engineers may be undertaken by skilled non-professional staff.

The construction or acquisition by the larger generating companies of overseas power stations and other facilities has meant that staff at all levels of seniority are now required to work abroad on short or medium term projects. This, again, has tended to give young engineers the chance to exercise professional responsibility and autonomy earlier in their careers than they might have done locally.

In the past it was relatively rare for distribution engineers to achieve professional mechanical engineering status. However, with the advent of "multi-utility" companies providing several services, e.g. water, gas, electricity, domestic appliances and even mobile phone facilities, engineers may be responsible for the operation and/or maintenance of more than one distribution network and 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 (e.g. Powergen's PPEDS) 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

The structure of a typical modern power station, under the overall control of a station or site manager, is likely to include the following functions:

- Operations & Maintenance
- Engineering
- Performance & Environment
- Human Resources
- Finance & Procurement

The first three functions are likely to incorporate a significant engineering content and the Head of each of those functions may be expected to fulfil the Institution's requirements for the class of Member.

Each functional head will have a number of subordinate staff, under the following main categories:

- Team Leader(s)
- Support Engineers
- Support Technical Staff
- Support Manual Staff

The distinctions between the various support categories are less clear-cut than hitherto and all staff are often on a single salary structure and common terms of employment.

Team Leaders' work areas can typically include project management, planning, control, operation and maintenance and, on a station of over ~1000MW installed capacity, should be expected to fulfil the Institution's requirements for the class of Member. Team Leaders are likely to have responsibility for a number of projects on an ongoing basis (broadly equivalent to that of the former 1st Engineer grade).

Support Engineers assist Team Leaders in any of the work areas mentioned above, their responsibilities being more appropriate to AMIMechE or MIIE levels. The same may be true of Support Technical or Support Manual Staff. In certain cases, however, the responsibilities of Support Engineers (broadly equivalent to those of the former 2nd Engineer grade) may approach MIMechE level.

On the operations side, traditional posts such as Shift Charge/Assistant Shift Charge Engineer have been replaced by that of Shift Supervisor, with responsibility for both operations and maintenance. Assistant Operations/Control Engineers have been superseded by Unit Operating Technicians, while Foremen are now "team leaders" (not to be confused with Team Leaders above) - broadly equivalent to the former 3rd Engineer or Technician level. Most generating companies, as part of their professional engineers' development programme, offer shift staff periods of secondment or job rotation into project-oriented work, e.g. the planning of plant modifications or major outages, to give them the opportunity to exercise a greater level of engineering judgement and expertise than they might need in more routine operational duties.

Assessment of Competences

Professional mechanical engineering responsibilities for the positions described above will, of course, depend to a large extent on the particular location, the type of plant installed and the individual's job description. For example, the above structures may be reflected to varying extents in those at sites other than power stations, e.g. in headquarters engineering departments. 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.**

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 electrical power industry, be it in operations, maintenance, engineering services, design or in 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:

- Theoretical studies of design or operational problems in existing power station plant, either in a design and manufacturing environment or in a specialist service department of a generating company.
- Participation in the evolution, development, manufacture and commissioning of new designs of plant, including performance evaluation and the investigation of operational failures. Examples include novel materials for gas turbine components, unconventional alternative fuels and the advanced treatment of power station effluents.
- Secondment in any of the above areas to, e.g., overseas locations, where support facilities may be severely limited. Secondments from power stations to in-house engineering departments and plant manufacturers would also be expected to provide opportunities for the development of professional engineering expertise and technical judgement.

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

Competence statement C

As many generating 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 plant 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:

- The planning and personal supervision of plant outages and maintenance projects.
- Active participation in design review.
- The periodical review of maintenance and/or operational strategies for existing items of plant and the formulation of new procedures and systems for additional items and novel processes.

- The in-house training and development of technicians and skilled craftsmen, possibly on a project-by-project basis.

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 presenting 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 in-house management at various levels, outside clients and contractors; subjects could include project plans, business plans, etc.
- Whether the applicant is involved in contract liaison and negotiations - systems, procedures, method statements, safety, etc.

Competence statement E

The observance of safe working procedures, including compliance with internal and national codes of practice, is inherent in virtually all engineering activities on power stations. Similarly, there are codes that cover the design and manufacture of all major plant components. Applicants should be able to demonstrate their commitment to observing and promoting the use of any such codes that are relevant.

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
- 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 generating company should still be considered as generally likely to meet the requirements for the class of Fellow:

Director
Corporate Branch Head
Station Manager
Project or Group Manager

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. renewable energy or environmental technology, 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 generating companies and in firms that design and manufacture power generating plant and associated equipment. 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).