

Competence Profiles – Guidance for applicants and Assessors

PART 2 – INDUSTRY CLASSIFICATION (ST) – STEEL PRODUCTION

Introduction

Since the privatisation of British Steel in 1989, this major and other smaller steel producers have experienced severely adverse trading conditions and have undergone major reorganisations and consolidation. The former British Steel merged with the major Dutch steel maker Koninklijke Hoogovens N.V. in 1999 to form Corus; this company has become both more diverse in its products (now including aluminium) and more active internationally, creating the need for additional mobility and flexibility of professional staff. Production units within the group now exist in France, Germany, Holland, Belgium and the U.S.A. A similar situation has applied to the main supplier of stainless steel (Avesta), having production operations in Sheffield and Sweden, and which has now combined with Outokumpu in Finland to become Avesta Polarit (in which Corus has a 23% interest).

Small and medium-sized steel producers typically have an electric arc furnace plant located next to a continuous casting plant for billets, and a single-product rolling mill serving a regional market – and using locally arising scrap as raw material. This contrasts with the larger steel making operations, which usually need to be near the coast to take advantage of bulk-carrier shipping delivering imported ore and coal.

Currently, steel production uses two principal processes: (i) converting iron ore to liquid iron and thence by further refining into steel – known as an 'integrated iron and steel making' process, and (ii) electric arc melting of steel scrap to produce carbon, alloy, and stainless steels, typically for the automotive, specialist engineering and domestic product markets. The integrated iron and steel plants usually have a capacity between 1.5 and 5 million tonnes annually, whilst the arc plants typically produce between 0.5 and 1.2 million tonnes p.a.

As an example of management restructuring – and one that is particularly relevant to engineers – Corus has separated its major engineering resource from the management of steel production operations. An Engineering Services organisation now covers design, project engineering and site maintenance activities; there are also manufacturing, major repair and maintenance workshops. These not only serve the steel making sites themselves, but also offer their resources outside Corus to gain revenue. Thus a greater need exists for engineers to become more commercially aware and to be able to recognise business opportunities outside their basic industry.

The above background means that Membership applicants should demonstrate either direct experience of or close relationships with activities such as:

- Problem definition and solution evaluation
- General and detail design management
- Preparation of tender specifications
- Procurement and contract management
- Manufacture, fabrication, and site installation
- Resource planning and allocation
- Legal and safety issues (e.g CDM Regulations, COMAH)
- Maintenance planning and plant outages
- Multi-discipline co-ordination
- Environmental issues

These areas of activity are reflected in the Competence unit descriptors under the section 'Requirements for election or transfer to Member' that follows. The degree of experience or contact with each activity is more relevant than the jobholder's grade or title at the time of assessment.

Requirements for election or transfer to Member

For an applicant whose job is within an 'Engineering Services' function, his or her position is likely to be one which has responsibility either for a group of at least two or three technical staff, or for a larger group of craftsmen employed either in a manufacturing or maintenance workshop, or in a site construction activity.

The position will involve planning, work allocation, supervision and some exposure to industrial relations or human resource factors.

An applicant whose job lies in a production unit (e.g. ore preparation, materials handling, iron making, steel making, continuous casting, a rolling mill or a specialist finishing process) may either have responsibilities as above, or will probably be more involved with specifying and planning maintenance or project installation work associated with contract management and site supervision. As in other heavy industries, the responsibilities for both operations and maintenance are often combined into one job (e.g. Manufacturing Engineer). However, mechanical and electrical engineering responsibilities mostly remain separate and distinct.

The following job titles are given as examples from the Corus organisations that would normally be expected to satisfy the competence levels for Member (but subject to the individual's job scope and responsibilities):

Iron & Steel Production
Plant Engineer
Manufacturing Engineer
Development Engineer
Process Engineer

Projects and Technical, Engineering Services
Project Engineer
Project Manager
Senior Design Engineer
Manufacturing Engineer
Planning Engineer

Not all the above titles apply to every steel works – and titles are frequently changing. As an indication of posts that might better suit the AMIMechE level, the term 'technician' or 'technologist' often occurs within the job title. With the advent of 'team working', graduates (and technologists) in their formative years may experience a rôle as Team Leader; this responsibility could well match the requirements for AMIMechE.

In short, it will no longer be appropriate to recommend election to Member on the basis of job title or grade alone.

Assessment of competence statements A & B

Engineering responsibilities will depend on the applicant's current rôle within either manufacturing or engineering services. 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 iron and steel industry, be it in operations, maintenance, engineering services or in any of the other areas referred to 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:

- Involvement with design or other applications of theory
- Welding technology
- Heat resistance and refractories
- Application of specialist materials
- Prevention of materials failure – fatigue, creep, erosion, corrosion, etc.
- Knowledge of maintenance, shutdown and commissioning routines
- Works' utilities systems – pumps, compressors, valves, and piping
- Energy saving techniques and environmental improvement
- Failure investigations and any related experience of improvements
- Bearing types, applications and maintenance
- Hydraulics - basic and advanced
- Plant condition monitoring
- Basic electrical applications, e.g. drive controls, power distribution, high voltage safety, PLC applications

Whilst an individual applicant may not be able to demonstrate in-depth experience with all the above, he or she should know where to acquire any additional inputs necessary, for example from research, commercial, or finance functions.

Against a background of international business activity, the applicant should either have had some experience of overseas secondments or visits, or be able to demonstrate some contact with overseas suppliers, design specialists, steel plants, or other manufacturers.

Assessment of competence statement C

Direct line management experience of 'in-house' manpower resources may frequently be superseded by the need to manage contracts and other bought-in services. In the Engineering Services type of activity, equivalent competence would be demonstrated by an adequate level of technical expertise within a small team, developing designs and technical solutions for plant improvements or new installations.

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.
- Programme planning and budget estimating for a new project, plant modification or other installation.
- Involvement with preparing a business plan to sell engineering services to clients outside the industry.

Assessment of 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.

Assessment of competence statement E

The observance of safe working procedures, including compliance with internal, British and international codes of practice, is inherent in virtually all engineering activities on iron and steel making plant. Examples include plant safety instructions - safe use of lifting gear, scaffolding, working at heights, etc.; fire prevention - safe means of escape, fire-fighting systems; and equipment guarding and safe access, e.g. for rotating machinery and belt conveyors. 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

Applicants for election to Fellow or transfer from Member to Fellow should hold senior posts corresponding to departmental manager or above, as judged by the relevant position within the organisation and the resources controlled. They should be involved with topics wider than engineering itself, such as personnel development, finance, budgeting, company or organisation policy, commercial and local community issues. They should also be capable of demonstrating a contribution to the strategic development of their organisation. Typical posts would have titles such as Manager, (Department or Works area), Works Engineer, Chief Engineer, Plant Engineer, or Project Manager.

It is desirable that applicants should have involvement with one of the Institution's Area, Regional or Divisional Committees, together with experience of presenting papers or chairing conferences related to his or her own field of activity. Ongoing personal development since becoming chartered should be demonstrable, especially by exposure to 'outside world' authorities that influence the applicant's business. Examples of suitable CPD activities not covered under the Membership 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).