

# Supported Registration Scheme (SRS) Toolkit

Improving the world through engineering

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## Section 1

### SCORING FOR UK-SPEC (UK Standard for Professional Engineering Competence)

Consistent scoring and developing best practice across the engineering profession is the aim of the Institution of Mechanical Engineers (IMechE) and the Engineering Council.

These level descriptors provide guidance for mentors to score levels for **total competence** as a professional engineer. They are used for both Incorporated (IEng) and Chartered (CEng) engineers.

Many mentors will use 'overall competence as a professional engineer' as their guideline for scoring competence throughout Initial Professional Development (IPD). This would show a progression of scores over the period of development.

Scores 1-4 are used to assess whether a Developing Engineer has reached a level of competence appropriate for a professional registration interview. As a rule, it is unlikely that individuals in year 1 of development would be scoring at level 3.

The minimum scores for consideration for professional registration and corporate membership of the Institution are 3x3's and 2x2's in the 5 UK-SPEC competences.

**Level 1 = AWARE:** Performs the activity with significant supervision and guidance; performs basic routine and predictable tasks; little or no individual responsibility. *(This level of competence would not normally be sufficient for election to membership).*

**Level 2 = FAMILIAR:** Performs the activity in a range of contexts; supervision only required in more complex circumstances; some individual responsibility or autonomy. *(This indicates a minimum level of competence for election to membership, which should be supplemented, by higher levels of competence in the areas most relevant to the field of engineering in which the applicant is employed).*

**Level 3 = SKILLED:** Performs the activity in some complex and non-routine contexts; significant responsibility and autonomy; can oversee the work of others. *(This indicates a normal level of competence for election to membership).*

**Level 4 = EXPERT:** Performs the activity in a wide range of complex and non-routine contexts; substantial personal autonomy; can develop others in the activity. *(This indicates a high level of competence and suitability for election to membership and possibly fellowship).*

## Section 2

### EXAMPLE REPORTS

#### QUARTERLY REPORTS

If you use the simplest method of reporting, without using option tools such as Plans and Evidence, UK-SPEC must be clearly outlined as per this example of good practice.

- Go to Reports
- Create Quarterly Report
- Add your objectives
- Type your report details or cut and paste from a word document into the quarterly report area
- Use the 'first person' style of writing OR
- Use bulleted lists with an explanation of your involvement
- Outline your activities, roles, responsibilities and learning outcomes (Reports should be no more than 200-500 words)

#### **(Example of a 'first person' style of writing)**

Continuing in my role as an assistant requisitioning Engineer on the Air Cooled heat Exchanger (ACHE) package, the past quarter was spent on review of more supplier documentation.

The first and one of the most important documents I reviewed during this period were general arrangement drawings, GA. These act as a reference drawing for all engineering disciplines when looking for the size, layout and mounting position and details of the exchangers. During review of the GAs, my team (mechanical) and the piping group observed that the proposed ACHE dimensions had changed from those at the purchase order stage. I gained a greater appreciation for the space limitation and tolerance available in locating equipment on the piperack. (A1) (A2) (B3) (E1) (E3) (E4)

My next task was the review of mechanical calculations. This was necessary to confirm the stresses calculated by vendor and formulae used to calculate the stresses. The primary stresses concerned were membrane stresses within the plates, bending moments and tube stresses. I found this task most useful as it required careful referencing of the ASME design code to confirm the correct formulae is used for the type of heat exchanger construction. I also developed a simple calculation spreadsheet which I used to double check the supplier's stress values (attached as evidence). (A1) (A2) (B3) (E1) (E3) (E4)

Following the mechanical calculations I reviewed the inlet and outlet header box detail drawings. This exercise gave me a better understanding of how the equipment is assembled (welding) with emphasis on the type of welds used at various joints. Other documents e.g. weld procedures, not reviewed by the mechanical group but as assistant requisitioning engineer it was my responsibility to ensure that other departments involved, review and return the documents promptly to maintain schedule dates (A1) (A2) (B3) (C4) (D3) (E1) (E3) (E4)

During this quarter I also took the opportunity to become a STEM (Science Technology Engineering & Mathematics) ambassador.

## Evaluation of the Period

The past quarter has been challenging but very useful because all issues were directly related to mechanical engineering. Working with design codes when directly applicable to project deliverables has been very useful, helping me to become more familiar with the codes and standards, which has been a priority since the start of my MPDS program.

Being the focal point (assisting) on a large package, I am working with various other engineering disciplines, disseminating large Volumes of documentation and working to a demanding schedule. Managing all these factors well will take more practice and is crucial for me as it is a transferrable skill and one that is crucial to my career progression.

With regards to becoming a STEM ambassador; I am appreciative of the opportunity to be in a reputable profession and would like to help younger people as well as improve the profile of my company, profession and institution.

The past quarter has been fairly busy, leaving little time for training courses so I focused on work based learning.

### **(Example of a bulleted list with an explanation of my involvement)**

In a move to work closer to other XXXXX companies I

- started a joint project with our German sister company
- developed new products which would form the basis of the next generation of friction materials for both companies
- arranged for disc brake testing to be carried out in the UK
- established what kind of testing would be required

This responsibility gave me more experience in working with people from outside the UK but without the "stress" of working with a customer. In order to achieve common development targets I

- compared our German company's dynamometer's results with our own
- translated the documents into English
- summarised the translations, our schedules and made the comparisons
- developed new schedules to contain the best schedules of both
- determined whether the test routines for both companies are similar
- gained a good understanding of the technical German used in this industry for future projects

To test the integrity of CV disc pads they are subjected to extreme conditions on a vehicle endurance road route. On a vehicle this can be a time consuming exercise but I

- developed a new dynamometer simulation of a typical road route by analysing actual test results of a route and transferring the stop parameters to a dynamometer schedule
- realised, after the first attempt, that the timings were too tight for this dynamometer and a simpler temperature cycle was used. However, this schedule is available for use on other dynamometers

The project involving the replacement of an asbestos material continued and there was a great deal of customer pressure to commit more resources to this project. However I

- had to resist this since there were more important projects requiring manpower and the value of the business with this customer was not enough to raise its priority

- was able to use previous test results to convince the customer we could provide him with a solution and
- was able to promise some further confirmation test work after being allocated a slot in the busy dynamometer testing timing plan

After many delays the XXXXXX test vehicle was ready for collection and the contract to cover the vehicle loan was given to our legal representatives who insisted on many changes. I

- insisted that the contract was signed quickly and it was agreed that many changes were not necessary
- pointed out that the changes of legal jargon would make little sense in German
- arranged the logistics of the transfer, legal requirements of driving the vehicle, vehicle registration, Customs and Excise, tax, travel plans and insurance
- was able to negotiate the vehicle insurance premium down by reducing the value insured £0.5m to £0.25m

This experience was invaluable as I was able to help colleagues to carry out similar transfer exercises.

## Section 2

### EXAMPLE REPORTS

#### QUARTERLY REPORT Using Evidence submissions

Note: This example shows how text is restricted in Plans and Evidence. Brief notations are suggested, rather than lengthy elaboration. The evidence submission acts as a reminder for items to include in the quarterly report synopsis.

#### Quarterly Report – Chartered Engineer

##### Year 1 Quarter 3

Notice: no plan approved for this quarter

Competences:

- CE-A.1-Maintain and extend a sound theoretical approach in enabling the introduction of new and advancing technology and other relevant developments
- CE-A.2-Engage in the creative and innovative development of engineering technology and continuous improvement systems
- CE-B.1-Identify potential projects & opportunities
- CE-B.2-Conduct appropriate research, and undertake design and development of engineering solutions
- CE-C.1-Plan for effective project implementation
- CE-C.2-Plan, budget, organise, direct and control tasks, people and resources
- CE-C.4-Bring about continuous improvement through quality management
- CE-D.1-Communicate in English with others at all levels
- CE-D.2-Present and discuss proposals

- CE-D.3-Demonstrate personal and social skills
- CE-E.1-Comply with relevant codes of conduct
- CE-E.2-Manage and apply safe systems of work

**Evidence submitted during this quarter:**

- Electrical assessment form Year 1 Quarter 3 19 Aug 2011 Location: GPAF Barry Electrical.tif

Notes:

graduate placement assessment form for my time on the electrical section

Review:

Reviewer: XXXXXXXXXXXXXXXX Date: 26 Aug 2011 Status: Accepted

Reviewers Notes :

Associated Competences :

- Manufacturing assessment form Year 1 Quarter 3 19 Aug 2011 Location: GPAF Barry Manufacturing.tif

Notes:

Graduate placement assessment form for my time in Alstom Train manufacturing plant, Barcelona

Review:

Reviewer: XXXXXXXXXXXXXXXX Date: 26 Aug 2011 Status: Accepted

Reviewers Notes :

Associated Competences :

- MA set Turnkey Year 1 Quarter 3 22 Aug 2011 Location: excel tables in personal folder

Notes:

I have been working on a project, which involves the engineering support for the conversion of Mark 3 Trailer Standard Open (TSO) coaches by adding a buffet facility. A more powerful motor-alternator set is needed to meet the increased current demand of the modified vehicle. This more powerful MA set is going to be taken from other redundant vehicles and will be fitted to the TSO, together with other electrical equipment. 11 major electrical locations were identified and it was my job to identify the components that were in each location. I did this by using illustrated

parts manuals, electrical schematics, wiring diagrams and general arrangement drawings. After finding the components in each box/location it was necessary to find out how they were wired together.

Review:

Reviewer: XXXXXXXXXXXXXXXX Date: 26 Aug 2011 Status: Accepted

Reviewers Notes :

Associated Competences :

- CE-A.1-Maintain and extend a sound theoretical approach in enabling the introduction of new and advancing technology and other relevant developments (Level: 1)
- CE-B.2-Conduct appropriate research, and undertake design and development of engineering solutions (Level: 1)
- CE-C.1-Plan for effective project implementation (Level: 0)

- Co-ordination of proposal for graduate placement Year 1 Quarter 3 22 Aug 2011 Location: In personal folder

Notes:

I volunteered to arrange a meeting that would discuss a possible opportunity for sending graduates to gain some infrastructure experience working for Network Rail. I arranged a meeting and from the meeting it was decided a letter should be drafted. I spoke with a former graduate who has worked closely with Network rail and was able to find from

him the types of work which Network Rail conduct in their premises in Derby. I drafted a letter trying to put forward a convincing argument. I was told it was too long for the person which I was addressing, and the request wouldn't be granted if not worded in the right fashion. I therefore revised it and the letter was then sent. A positive reply was later received.

Review:

Reviewer: XXXXXXXXXXXXXXXX Date: 26 Aug 2011 Status: Accepted

Reviewers Notes :

Associated Competences :

- CE-B.1-Identify potential projects & opportunities (Level: 1)
- CE-D.1-Communicate in English with others at all levels (Level: 1)
- CE-D.2-Present and discuss proposals (Level: 1)

• Manufacturing Placment Year 1 Quarter 3 22 Aug 2011 Location: In personal folder

Notes:

I was based in the logistics department for my manufacturing placement. In the first week I was trained in a lean manufacturing tool, developed for xxxxxx. It was called MIFA, and stood for Material and Information flow analysis. It was a tool that used a simple graphical representation of the flows from suppliers through to the fabrication line, and allowed for easy identification of areas of 'waste' such as duplication of processes of excessive time being stored

as WIP. After the first week of training which involved carrying out two guided analyses I was given the responsibility

to carry out my own MIFA's. The first and largest was for four weeks and included a detailed study of the flows relating to the aluminium profiles for one of the Alstom projects.

Review:

Reviewer: XXXXXXXXXXXX Date: 26 Aug 2011 Status: Accepted

Reviewers Notes :

Associated Competences :

- CE-A.1-Maintain and extend a sound theoretical approach in enabling the introduction of new and advancing technology and other relevant developments (Level: 1)
- CE-A.2-Engage in the creative and innovative development of engineering technology and continuous improvement systems (Level: 1)
- CE-B.2-Conduct appropriate research, and undertake design and development of engineering solutions (Level: 0)
- CE-C.1-Plan for effective project implementation (Level: 1)
- CE-C.4-Bring about continuous improvement through quality management (Level: 0)
- CE-D.2-Present and discuss proposals (Level: 1)
- CE-D.3-Demonstrate personal and social skills (Level: 1)
- CE-E.1-Comply with relevant codes of conduct (Level: 0)
- CE-E.2-Manage and apply safe systems of work (Level: 1)
- CE-E.4-Carry out continuing professional development necessary to maintain and enhance competence in own area of practice (Level: 1)

• Preparation for placement in train manufacturer in Spain Year 1 Quarter 3 31 Aug 2011 Location: In personal folder

Notes:

I invested considerable effort in organising a manufacturing placement in Spain. I wanted to work for a manufacturer that built new trains and I also wanted to use a further opportunity to improve my Spanish. After gaining approval from xxxxxx by presenting a budget and reasons why I thought a placement abroad would be valuable, then got in contact with an Alstom manufacturing site in Barcelona. I needed to translate various documents to Spanish and send various emails to explain the objectives of a manufacturing placement. I also co-ordinated a site visit by the xxxxxxxxxxxx HR manager and myself, to discuss possible projects and carry out a safety visit.

Review:

Reviewers Notes :

Associated Competences :

- CE-B.1-Identify potential projects & opportunities (Level: 2)
- CE-C.1-Plan for effective project implementation (Level: 1)
- CE-C.2-Plan, budget, 9organize, direct and control tasks, people and resources (Level: 1)
- CE-D.2-Present and discuss proposals (Level: 1)
- CE-D.3-Demonstrate personal and social skills (Level: 2)
- CE-E.1-Comply with relevant codes of conduct (Level: 1)
- CE-E.2-Manage and apply safe systems of work (Level: 2)
- CE-E.4-Carry out continuing professional development necessary to maintain and enhance competence in own area of practice (Level: 2)

**Quarterly Report:**

During my time on the electrical section I accompanied an engineer to a depot to learn about fitting and testing electrical equipment. I helped fit some OTMR equipment, which has a similar function to a black box on an aeroplane, and a data logger to the control system of an engine on a class 43 locomotive which had been experiencing engine shutdown. It was important to fit the diagnostic device in order to establish the reason for shutdown. Both experiences helped me appreciate the need to set up a safe systems of work.

Principle project involvement is the conversion of Mark III Trailer Standard Open (TSO) coaches by adding a buffet facility. A more powerful motor-alternator set was needed to meet the increased current demand of the modified vehicle. My work involved identifying the electrical systems located on the underframe, which I modified to accommodate more powerful MA sets. I identified 11 major electric components and used the illustrated parts manuals, electrical schematics, wiring diagrams, photos from the boxes and general arrangement drawings and found out how they were wired together.

I pursued and arranged meetings for a placement and identifying the scope of same. I prepared the correspondence that ultimately led to an agreement to accommodate me on mechanical graduate placement.

I also arranged my manufacturing placement in Spain. I arranged a Safety visit at the Barcelona factory and I visited the site to discuss the work which I would undertake whilst there. I witnessed the various activities in the factory and ensure that they controlled all risks to safety. I also had to arrange accommodation and flights.

I was based in the logistics department and introduced to a lean manufacturing tool, called MIFA, Material and Information Flow Analysis. I used this for simple graphical representation of the flows from suppliers through to the place where they are used, allowing me to identify areas of 'waste' such as duplication of processes or excessive time being stored as WIP. This study lasted 4 weeks and included a detailed study of the flows relating to the aluminium profiles for one of the xxxxx projects. The main problem was that they were storing a lot of stock, so I looked at the financial implications of this, which involved creating a spreadsheet that would correctly identify the value of the WIP on various dates, and how much it cost to store it. My recommendations included changing the planned orders to allow for a reduction in WIP. In my final week I carried out a process mapping technique of internal material flows for the process of soldering a headstock. At the same time I was responsible for aiding the training of two work experience students who would carry on the material flow studies after I finished. I was also able to speak with people in other departments such as engineering, production and quality to learn about their impact on train manufacturing activities. I also improved my Spanish as I had to gather information from many different people from around the factory, and present my findings to the Engineering Director.

**Developing Engineers Evaluation of the period:**

I have really enjoyed being able to work in a Spanish factory in order to gain an insight into manufacturing operations and also with the chance to improve my technical Spanish. I also liked working in the electrical section where I was able to be involved with the MA set turnkey project, and was able to be given the responsibility of correctly identifying all relevant electrical components.

**Mentors Review :**

Another confident period of development and xxxxxxxx is clearly moving forward and gaining further confidence and competence. Xxxxxxxx learnt a lot from his placement in Spain and it was a good opportunity to develop further language skills. Xxxxx has become a reliable member of the team.

**Status:** Accepted

**Status Date:** 21 Sep 2011

## Section 3

### EXAMPLE REPORTS MENTOR COMMENTS - ANNUAL ASSESSMENT

- The Annual Assessment is generated by the Developing Engineer.
- Information for each competence area of the Annual Assessment is auto-mapped from the 'evidence' submitted that has been submitted against each quarter.
- If no evidence has been submitted then the Developing Engineer can add details in the competence boxes if they wish.
- When the report is 'Submitted' it is auto-sent to the mentor who will award the competence scores for A, B, C, D and E and then mark the report as 'Approved'.
- The mentor will also complete the following section of the Report:

(Used with permission of owner)

#### 1. Main responsibilities in the post/s held during this period

A list of the XXXXXXXX sections that xxxxxxxx has worked in together with his main roles :

Business Consulting

Finding data and helping write a presentation given by the Strategic Projects Director at a conference of clients held in Sweden. Researching potential commercial opportunities for the Business Consulting section across Europe.

Mechanical

Learning about how to use the Finite Element tool Ansys to solve structural problems of a control rod and helping with a survey assessing the condition of a fleet of vehicles.

Electrical

Two visits to depots to fit electrical equipment (including night work) and involvement with the electrical implications/changes within a turnkey project of the conversion of a mark 3 coach.

Audits and Safety

Creating and developing resources to support xxxxxxxxxxxx's work as a Notified Body. Two product and process audits and a corrosion inspection of a sample of a fleet of vehicles.

<p>He has also done a practical engineering course and a 6-week manufacturing placement with xxxxx in Spain (where he conducted studies of Work In Progress).</p>
<p><b>2. Assessment of performance; detail notable successes or failures</b></p>
<p>Confident start to career within Railway Consultancy. Design build project at Rugby successfully completed. Self motivation enabled an overseas placement to be realised that allowed xxxxxxxxx to improve his technical Spanish.</p>
<p><b>3. Details of any technical, commercial or management courses which the graduate has attended</b></p>
<p>Personal Track Safety Course; Traction and Rolling Stock Course; Depot Awareness and Various Technology Briefings; Presentation Skills Course</p>
<p><b>4. What role/s will be undertaken by the Developing Engineer in the next twelve months and how will these help him/her to develop the competences required for this chart?</b></p>
<p>xxxxxxx will be finishing off the graduate training scheme with remaining placements in Sales and Marketing, Maintenance, Rolling Stock, Railway Systems and Infrastructure, and a regional office placement in London. He will also carry out two depot placements and is investigating a secondment to Melbourne. xxxxxxx to undertake more work with a technical content to build up his knowledge of engineering disciplines and how they are used in the railway industry.</p>

## EXAMPLE REPORTS

### MENTOR COMMENTS - QUARTERLY REPORT

**YR2 Q3:** (Used with permission of owner)

**Engineer's Evaluation of the Period:** An interesting 3 months in which I have developed my knowledge in the field of alternative fuels and vehicle emissions and significantly grown my network of contacts. I have had the opportunity to lead and manage others while my work in particulates measurements allowed me to develop deep technical knowledge in a specialist area.

**Mentor's Review:** Technical report writing skills have improved and there is distinct improvement in the presentation of this report. Good cross business exposure continues. Xyz is growing in confidence through his personal interaction within, and through supplier involvement. Xyz has joined the engineering analysis team and successfully managed the vibration damping trials. Objectives for the quarter have been met. There is continued technical and personal growth in a very promising Developing Engineer.

**Status:** accepted

**Status date:** 4<sup>th</sup> April 2011

#### Note

- Mentor comments assist the individual through feedback
- Mentor comments help plan the next period of development
- Mentor comments ensure the individual looks for opportunities to develop competence
- Mentor comments assist the professional review interview panel
- Mentor comments are evidence that monitoring has occurred

## Section 4

### Contacting the Institution of Mechanical Engineers

**Membership Enquiries**

**Tel: +44 20 7304 6999**

**Email: [membership@imeche.org](mailto:membership@imeche.org)**

- Academic assessment queries
- Is my degree accredited?
- Do I need Further Learning?
- Membership fees and subscription queries
- Upgrading from Affiliate to Associate
- Upgrade from Associate to Member

**Further Learning Helpline ..... Tel: +44 20 7304 6999**

**Career Developer Helpline ..... [mpds@imeche.org](mailto:mpds@imeche.org)**

#### **Further information on:**

- mentor roles and responsibilities can be found at:  
<http://www.imeche.org/learning/volunteering/support-and-resources/mpds-mentor/how-mpds-works>
- mentor guidelines can be found at:  
<http://www.imeche.org/learning/volunteering/volunteer-roles/volunteering-for-membership/mpds-mentor>