

The global network for the materials cycle



**Institute of Materials, Minerals & Mining**

# Guide to the Technical Case Study Route for Application as

**Chartered Engineer CEng**

## Introduction

---

The Technical Case Study Route (TCSR) enables individuals who have qualified as an Incorporated Engineer (IEng) with IOM3 to apply for registration as a Chartered Engineer (CEng) without the need to duplicate much of the documentary evidence. In order to demonstrate both the necessary underpinning knowledge and understanding through the Master's learning outcomes and the uplift in professional engineering competency from IEng to CEng, the key documentary evidence required from individuals applying through this route is the write up of a significant technical project they have undertaken in a Technical Case Study (TCS).

If you require a Reasonable Adjustment to be made to the application or assessment process, please let us know; there is also a box to tick on the application form to indicate this. If you request a Reasonable Adjustment, a member of the IOM3 Team will contact you to see how best we can support you through the application process.

### Entry experience

The TCSR is founded on work-based learning and experience at an appropriate level, and as opportunities for career development vary from person to person, individuals wishing to apply through this route should seek the advice of the Membership team on their suitability before applying. As a general rule however, IOM3 will not consider anyone for the TCSR with less than 2 years post IEng qualification appropriate work experience.

## Process

### Step 1: The Summary

---

Before writing the TCS, applicants must first submit a summary of the subject matter for approval. This is to ensure that it will meet the requirements in terms of its scope and level. The Summary should ideally be no more than 800 words and text only.

The Summary should use the following headings:

- Your name and Institute membership number
- Title of the TCS
- Your role in the work forming the basis of the TCS
- Introduction including background to the project being written up
- Key objectives
- Challenges encountered
- Technical review of the engineering, scientific and technological principles encountered
- Resolution of the objectives
- How the UK-SPEC CEng competences have been met.
- Conclusions and lessons learnt

### Step 2: Submission of the Summary

---

Once drafted, the applicant should submit their summary to the Institute with an up-to-date copy of their CV.

The Summary will be reviewed by two TCS assessors and the applicant advised of the outcome and the length of TCS they should submit within 4 weeks. Once approved, the applicant will have 9 months in which to prepare and submit their TCS. An extension may be sought if circumstances prevent its completion. The granting of any extension is at the discretion of the Membership Committee and the maximum period that may be granted is 3 months. If the outcome of the review is not successful, the applicant will be encouraged to resubmit along the lines of feedback and guidance from the Membership Committee.

All TCS will have a minimum word length of 4,000 words.

## Step 3: Preparation of the TCS

---

### Content

The TCS should include a commentary, diagrams and calculations which together demonstrate an understanding of fundamental engineering principles of the TCS outlined in the Summary and cover the following five areas of learning:

- Science and mathematics
- Engineering analysis
- Design and innovation
- The Engineer and society
- Engineering practice

**Indicative** content may include:

- Mathematical aspects and calculations
- Details on Standards that must be conformed with
- Use of appropriate software to solve problems and reach engineering solutions
- Application of new and innovative technologies relevant to the subject of the project
- Application of analysis and modelling
- Evaluation and exploitation of sustainable technologies
- Establishing fitness for purpose using reliable quantitative methods
- Solution of practical problems
- Scientific knowledge of the properties of materials, minerals, ground conditions, components, and physical processes
- Selection and use of relevant equipment, tools processes or products
- The use and application of information from technical knowledge resources
- Application of engineering practices and processes such as in commissioning, design, maintenance, repair, refurbishment, and adaption

In addition, the applicant will need to provide evidence in the TCS that they have met all of the individual CEng UK-SPEC sub competences, details of which are given in appendix 1. After each instance where a sub competence is met, the applicant should reference the respective sub competence in brackets in the text thus:

.....this particular aspect of the project required me to complete a short course in coding (E4).

### Format

The following format for the TCS should be used:

#### Title page

This should include the applicant's name, membership number, date, report title and purpose of the report e.g., CEng application via the TCSR.

#### Executive summary

This should be a summary of the main objectives, conclusions, findings, and achievements.

#### Contents page

#### Introduction

This should clearly indicate what the report is about and rationale behind the subject.

#### Main body of the report

Applicants should be guided by the following points when writing this part of the report:

- This can be sub-divided but must demonstrate the application and understanding of engineering, scientific and technological principles
- Each section should have a clear theme with ideas presented in a logical manner backed up by data, references and calculations or other sources
- Ensure the content links to the subject of the report and to the aims and objectives

- Relevant diagrams or graphical supporting information can be included
- Any lengthy supporting calculations should be included as an appendix
- Evidence that during the delivery of the project the CEng UK-SPEC sub competences were met

### Discussion

This is where the applicant should develop reasoned arguments by applying their engineering knowledge and understanding.

### Conclusions

The applicant must be able to provide a considered opinion on their work linked to engineering, scientific or technological principles; identify lessons learnt; and recommend changes as a result of the work and implementation of these recommendations.

### Appendices

These should be limited to any calculations too lengthy for the body of the report, essential background data, drawings, or photographs.

**The applicant must sign-off their TCS under the statement:**

*I certify that this Technical Case Study is all my own work.*

### Mentoring Support

IOM3 offers workshops on the TCSR, which are free to attend, and subsequent 1:1 mentoring to the point of submission.

## Step 4: Submission of the Technical Case Study

---

The TCS should be submitted together with the following documents:

- Application form
- CV (if different at the time of submitting the summary)
- Current year's CPD Record and Annual Professional Development Plan

Information on preparing a suitable CPD Record, and Annual Professional Development Plan can be found in the **Guide to CEng, CEnv and CSci** registration, which is available from the Institute website.

Applications are only accepted in electronic form by email, and submissions should be made to [membership@iom3.org](mailto:membership@iom3.org). Receipt will normally be acknowledged within 5 working days. Please feel free to contact us if you do not receive an acknowledgement.

### Next steps

Following submission, the TCS and other documentation will be reviewed by two scrutineers, who can make one of two decisions:

- Accept and proceed to the Interview Stage
- Decline but recommend revisions; the re-submitted application pack will be assessed again

Applicants will be notified in writing of this decision and any further action required.

### Interview Stage

Applicants are required to undertake two interviews, the format being:

1. The **Technical Interview** to explore the depth and breadth of engineering knowledge and understanding; applicants will be expected to give a 10 minute, three-slide PowerPoint presentation on their technical case study at the start of the interview. Applicants who do not meet the appropriate standard will not be able to progress to the Professional Review Interview.
2. The **Professional Review Interview** which will assess an applicant's engineering competence.

Each interview will take between 45 and 60 minutes and be held on separate days.

**Final Decision**

The reports and recommendations submitted by the TCS assessors, scrutineers, and interviewers from both interviews together with a copy of the full application will be considered by the Membership Committee, who will take the final decision on the application. Applicants should receive notification of the outcome within 10 working days of the Professional Review Interview having taken place.

## Appendix 1 - Chartered Engineer (CEng) competence requirements

CEng shall:	The applicant shall demonstrate that they:
A. Use a combination of general and specialised engineering knowledge and understanding to optimise the application of advanced and complex systems.	1. Have maintained and extended a sound theoretical approach to enable them to develop their particular role.
	2. Are developing technological solutions to unusual or challenging problems, using their knowledge, and understanding and/or dealing with complex technical issues or situations with significant levels of risk.
B. Apply appropriate theoretical and practical methods to the analysis and solution of engineering problems.	1. Take an active role in the identification and definition of project requirements, problems, and opportunities.
	2. Can identify the appropriate investigations and research needed to undertake the design, development and analysis required to complete an engineering task and conduct these activities effectively.
	3. Can implement engineering tasks and evaluate the effectiveness of engineering solutions.
C. Demonstrate technical and commercial leadership.	1. Plan the work and resources needed to enable effective implementation of a significant engineering task or project.
	2. Manage (organise, direct and control) programme or schedule, budget and resource elements of a significant engineering task or project.
	3. Lead teams or technical specialisms and assist others to meet changing technical and managerial needs.
	4. Bring about continuous quality improvement and promote best practice.
D. Demonstrate effective communication and interpersonal skills.	1. Communicate effectively with others, at all levels, in English.
	2. Clearly present and discuss proposals, justifications, and conclusions.
	3. Demonstrate personal and social skills and awareness of diversity and inclusion issues.
E. Demonstrate a personal commitment to professional standards, recognising obligations to society, the profession, and the environment.	1. Understand and comply with relevant codes of conduct.
	2. Understand the safety implications of their role and manage, apply, and improve safe systems of work.
	3. Understand the principles of sustainable development and apply them in their work.
	4. Carry out and record the Continuing Professional Development (CPD) necessary to maintain and enhance competence in their own area of practice.
	5. Understand the ethical issues that may arise in their role and carry out their responsibilities in an ethical manner.

These competences are expanded on the following pages.

When drafting their professional review report, applicants could use the following as evidence to meet the various competences:

**A1 Have maintained and extended a sound theoretical approach to enable them to develop their particular role.**

- Formal training related to your role.
- Learning and developing new engineering knowledge in a different industry or role.
- Understanding the current and emerging technology and technical best practice in your area of expertise.
- Developing a broader and deeper knowledge base through research and experimentation.
- Learning and developing new engineering theories and techniques in the workplace.

**A2 Are developing technological solutions to unusual or challenging problems, using their knowledge, and understanding and/or dealing with complex technical issues or situations with significant levels of risk.**

- Carry out technical research and development
- Developing new designs, processes or systems based on new or evolving technology.
- Carrying out complex and/or non-standard technical analyses.
- Developing solutions involving complex or multidisciplinary technology.
- Developing new and evaluating continuous improvement systems.
- Developing solutions in safety critical industries or applications.

**B1 Take an active role in the identification and definition of project requirements, problems, and opportunities.**

- Identifying projects or technical improvements to products, processes, or systems.
- Preparing specifications, taking account of functional and other requirements.
- Establishing user requirements.
- Reviewing specifications and tenders to identify technical issues and potential improvements.
- Carrying out technical risk analysis and identifying mitigation measures.
- Considering and implementing new and emerging technologies

**B2 Can identify the appropriate investigations and research needed to undertake the design, development and analysis required to complete an engineering task and conduct these activities effectively.**

- Identifying and agreeing appropriate research methodologies
- Investigating a technical issue, identifying potential solutions, and determining the factors needed to compare them
- Identifying and carrying out physical tests or trials and analysing and evaluating the results
- Carrying out technical simulations or analysis
- Preparing, presenting, and agreeing design recommendations, with appropriate analysis of risk, and taking account of cost, quality, safety, reliability, accessibility, appearance, fitness for purpose, security (including cyber security), intellectual property constraints and opportunities and environmental impact.

**B3 Can implement engineering tasks and evaluate the effectiveness of engineering solutions.**

- Ensuring that the application of the design results in the appropriate practical outcome.
- Implementing design solutions, taking account of critical constraints, including due concern for safety, sustainability and disposal or decommissioning.
- Identifying and implementing lessons learned.
- Evaluating existing designs or processes and identifying faults or potential improvements including risk, safety, and life cycle considerations.
- Actively learning from feedback on results to improve future design solutions and build best practice.

**C1 Plan the work and resources needed to enable effective implementation of a significant engineering task or project.**

- Preparing budgets and associated work programmes for projects or tasks.
- Systematically reviewing the factors affecting the project implementation including safety, sustainability and disposal or decommissioning considerations.
- Carrying out a task or project risk assessment and identifying mitigation measures.
- Leading on preparing and agreeing implementation plans and method statements.
- Negotiating and agreeing arrangements with customers, colleagues, contractors, and other stakeholders, including regulatory bodies.
- Ensuring that information flow is appropriate and effective.

**C2 Manage (organise, direct and control) programme or schedule, budget and resource elements of a significant engineering task or project.**

- Operating or defining appropriate management systems including risk registers and contingency systems.
- Managing the balance between quality, cost, and time.
- Monitoring progress and associated costs and cost forecasts, taking appropriate actions when required.
- Establishing and maintaining appropriate quality standards within legal and statutory requirements.
- Interfacing effectively with customers, contractors, and other stakeholders.

**C3 Lead teams or technical specialisms and assist others to meet changing technical and managerial needs.**

- Agreeing objectives and work plans with teams and individuals.
- Reinforcing team commitment to professional standards.
- Leading and supporting team and individual development.
- Assessing team and individual performance and providing feedback.
- Seeking input from other teams or specialists where needed and managing the relationship.
- Providing specialist knowledge, guidance, and input in your specialism to engineering teams, engineers, customers, management, and relevant stakeholders.
- Delivering or developing a teaching module at Masters' level or leading a university research programme.



**C4 Bring about continuous quality improvement and promote best practice.**

- Promoting quality throughout the organisation as well as customer and supplier networks.
- Developing and maintaining operations to meet quality standards e.g., ISO 9000, EQFM.
- Supporting or directing project evaluation and proposing recommendations for improvement.
- Implementing and sharing the results of lessons learned.

**D1 Communicate effectively with others, at all levels, in English.**

- Preparing reports, drawings, specifications, and other documentation on complex matters.
- Leading, chairing, contributing to and recording meetings and discussions.
- Exchanging information and providing advice to technical and non-technical colleagues.
- Engaging or interacting with professional networks.

**D2 Clearly present and discuss proposals, justifications, and conclusions.**

- Contributing to scientific papers or articles as an author.
- Preparing and delivering presentations on strategic matters.
- Preparing bids, proposals, or studies.
- Identifying, agreeing, and learning work towards collective goals

**D3 Demonstrate personal and social skills and awareness of diversity and inclusion issues.**

- Knowing and managing own emotions, strengths, and weaknesses.
- Being confident and flexible in dealing with new and changing interpersonal situations.
- Identifying, agreeing, and working towards collective goals.
- Creating, maintaining, and enhancing productive working relationships, and resolving conflicts.
- Being supportive of the needs and concerns of others, especially where this relates to diversity and inclusion.

**E1 Understand and comply with relevant codes of conduct.**

- Demonstrating compliance with your Licensee's Code of Professional Conduct.
- Identifying aspects of the Code which are particularly relevant to your role.
- Be aware of the legislative and regulatory frameworks relevant to your role and how they conform to them.
- Leading work within relevant legislations and regulatory frameworks, including social and employment legislation.

**E2 Understand the safety implications of their role and manage, apply, and improve safe systems of work.**

- Identifying and taking responsibility for your own obligations and ensuring that others assume similar responsibility for health, safety, and welfare issues.
- Ensuring that systems satisfy health, safety, and welfare requirements.
- Developing and implementing appropriate hazard identification and risk management systems and culture.
- Managing, evaluating, and improving these systems.
- Applying a sound knowledge of health and safety legislation, for example: HASAW 1974, CDM regulations, ISO 45001, and company safety policies.

**E3 Understand the principles of sustainable development and apply them in their work.**

- Operating and acting responsibly, taking account of the need to progress environmental, social, and economic outcomes simultaneously.
- Providing products and services which maintain and enhance the quality of the environment and community and meet financial objectives.
- Recognising how sustainability principles, as described in the Engineering Council Guidance on Sustainability can be applied in your day-to-day work.
- Understanding and securing stakeholder involvement in sustainable development.
- Using resources efficiently and effectively in all activities.
- Taking action to minimise environmental impact in your area of responsibility.

**E4 Carry out and record the Continuing Professional Development (CPD) necessary to maintain and enhance competence in their own area of practice**

- Undertaking reviews of your own development needs.
- Planning how to meet personal and organisational objectives.
- Carrying out planned and unplanned CPD activities.
- Maintaining evidence of competence development.
- Evaluating CPD outcomes against any plans made.
- Assisting others with their own CPD.

**E5 Understand the ethical issues that may arise in their role and carry out their responsibilities in an ethical manner.**

- Understanding the ethical issues that you may encounter in your role.
- Giving an example of where you have applied ethical principles as described in the Engineering Council Statement of Ethical Principles.
- Giving an example of where you have applied, or upheld ethical principles as defined by your organisation or company.