

**THE INSTITUTION OF MECHANICAL ENGINEERS**

**FURTHER LEARNING  
INFORMATION PACK  
2014**



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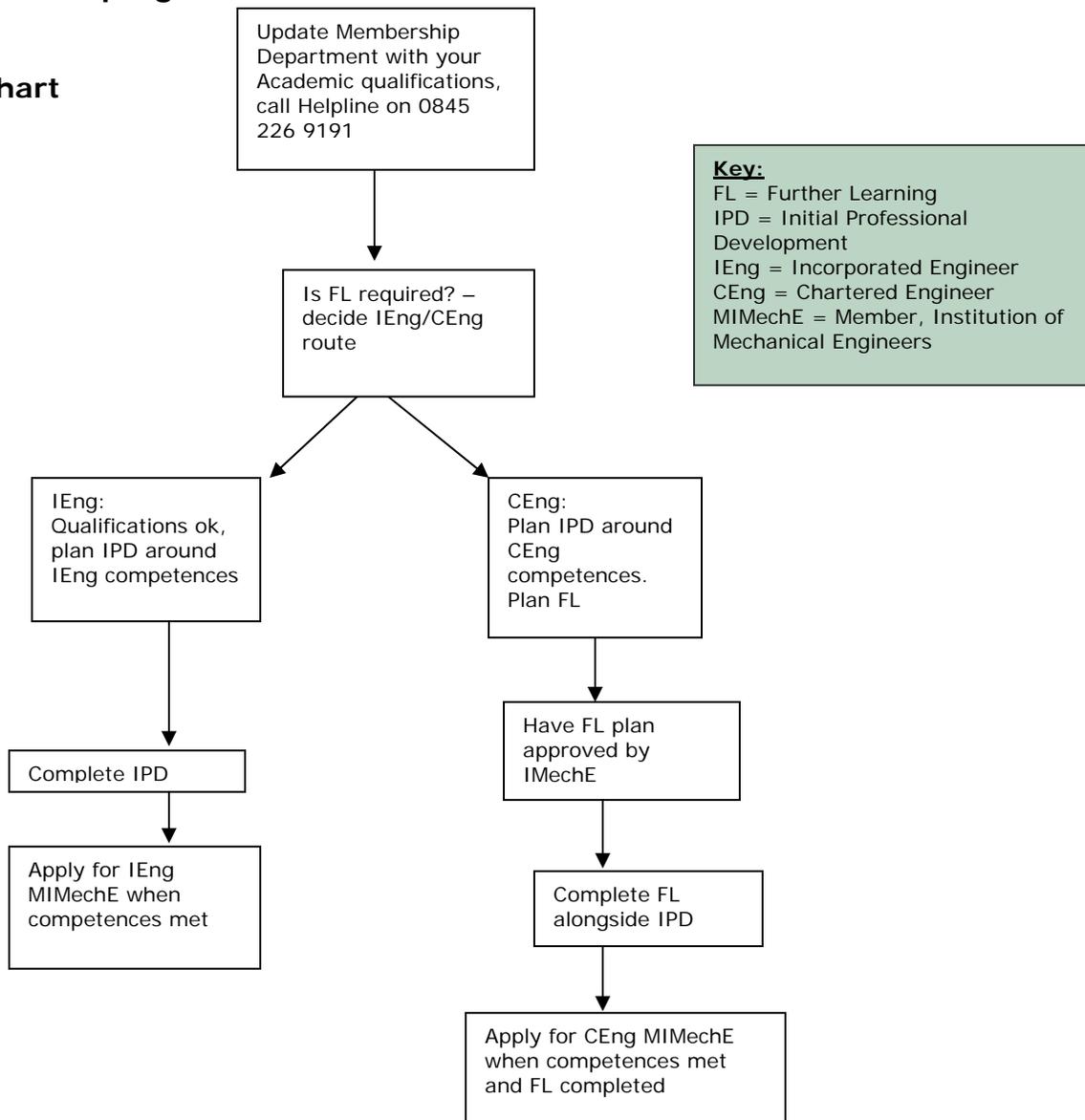
## SECTION 1: INTRODUCTION TO SUPPORTING INFORMATION

The information contained here is intended to equip you with the knowledge you need to make an informed decision about your route to Professional Registration with the IMechE. It isn't intended to cover all individual circumstances but should allow you to start thinking about which routes you could take and to plan how to get there.

This information is constantly being updated – if you are revisiting this after a period of time, please check our website [www.imeche.org](http://www.imeche.org). If, after reading the enclosed documents you are still unsure of how to plan your Further Learning, please email [membership@imeche.org](mailto:membership@imeche.org) for more assistance.

The flow chart below is a good starting point if you are unsure what your next step should be to become IEng or CEng. **However, choosing one path over the other does not rule out changing registration types in the future as your career changes and progresses.**

Flow chart



## **Frequently Asked Questions**

### **What levels of full professional registration are available?**

The professional registrations awarded by the IMechE on behalf of the Engineering Council include: Engineering Technician (EngTech), Incorporated Engineer (IEng) and Chartered Engineer (CEng). Successful applicants have the right to use the letters EngTech, IEng, or CEng after their name, demonstrating professionalism and commitment to engineering.

### **What is an Engineering Technician (EngTech)?**

EngTech are "Professional Engineers who are concerned with applying proven techniques and procedures to the solution of practical engineering problems. They carry supervisory or technical responsibility and are competent to exercise creative aptitudes and skills within defined fields of technology. Professional Eng Techs contribute to the design, development, manufacture, commission, decommissioning, operation or maintenance of products, equipment, processes or services; and are required to apply safe systems of working."

### **Can I be a Member of the IMechE as an EngTech whilst working towards IEng?**

Yes. The IMechE give the same member grade and benefits to EngTech Members as to IEng and CEng Members. There are progression steps between each of the registrations. Registration can be sought so long as the relevant academic and professional development competences have been met.

### **What is an Incorporated Engineer (IEng)?**

Incorporated Engineers are Professional Engineers who work across many industries in key roles. Incorporated Engineers apply their knowledge and understanding of engineering principles to operate and maintain engineering products, processes, systems and services. Incorporated Engineers will be experienced communicators with the ability to manage workloads and people within relevant safety and professional standards. A key characteristic of Incorporated Engineers is their ability to apply technology to its best advantage.

### **What are the benefits of IEng?**

Membership of the IMechE as an IEng allows you access to all of the events, library and professional development and networking opportunities available.

The Engineering Council and Institutions are working hard to promote all registration levels to potential registrants and industry as a whole. There is an international agreement called the Sydney Accord which recognises IEng and overseas equivalents in certain countries to make it easier to transfer your registration.

### **How do I become an Incorporated Engineer?**

The process of becoming an IEng with the IMechE is the same as the process to become Chartered – the only difference is the assessment criteria. Two key requirements have to be met – the academic base and Initial Professional Development.

The Academic requirements for an Incorporated Engineer are:

- An accredited Bachelors degree or honors degree in engineering or technology *or*
- An approved Higher National Certificate or Diploma or Foundation Degree in engineering or technology plus further learning (to Bachelors level) *or*
- An approved NVQ4 or SVQ4 *or*
- An accredited Higher National qualification started before September 1999

Initial Professional Development should be focused on gaining the correct competence as a potential Incorporated Engineer. The competences, which will be key to the application process when you apply as an IEng, are:

- A - Use a combination of general and specialist engineering knowledge and understanding to apply existing and emerging technology
- B – Apply appropriate theoretical and practical methods to design, develop, manufacture, construct, commission, operate and maintain engineering products, processes, systems and services.
- C – Provide technical and commercial management
- D – Demonstrate effective interpersonal skills
- E – Demonstrate a personal commitment to professional standards, recognising obligations to society, the profession and the environment.

When the academic and professional development criteria have been met a Professional Review process is undertaken. This constitutes a paper application (including application form, Professional Review Report (based on the 5 competences), a Development Action Plan and sponsor forms) and then an interview with two professional engineers, i.e. CEng or IEng as appropriate.

The process is designed to reward the competence, commitment and professionalism of those who become Incorporated Engineers.

### **How does IEng compare to CEng?**

The IMechE value both IEng and CEng equally – one cannot function without the other. Whilst the application process for IEng and CEng is identical, the assessment criteria for academic levels and competence skills are slightly different.

### **Can Incorporated Engineers become Chartered Engineers after a period of time?**

Yes. As long as both the academic and IPD competence requirements for Chartered Engineer can be demonstrated, individual Incorporated Engineers can become Chartered Engineers at any stage in their career progression.

For specific advice on how to apply for EngTech, IEng or CEng or for any other general membership enquiries please call 0845 226 9191 or email [membership@imeche.org](mailto:membership@imeche.org)

### **What is Further Learning?**

Further Learning is the demonstration of additional knowledge to reach the relevant academic benchmark for professional registration. From 1999, the academic benchmark levels were raised for both CEng and IEng. Therefore, to become a Chartered or Incorporated Engineer, as a rule of thumb, a graduate who started their degree course from 1999 onwards will need to demonstrate Masters Level Knowledge for CEng and Bachelors level knowledge for IEng. Further Learning is the term used to demonstrate additional knowledge and understanding gained to meet the relevant benchmark level, on top of any qualification held.

### **Who needs to do Further Learning?**

If your first degree is accredited by the Engineering Council, but it is not at the required level to demonstrate Masters level knowledge (i.e. BEng Hons and you are working towards CEng), then you will need to undertake Further Learning. Typically this includes most degrees started in or after 1999. If, however your first degree is not accredited, then it is advisable to have your first degree reviewed by the IMechE's Academic Assessment Committee, which will be able to tell you whether any additional demonstration of knowledge is required. This process can be explained by our membership team [membership@imeche.org](mailto:membership@imeche.org) or 0845 226 9191.

### **How do I fill in the application form (guidance notes)?**

The IEng and CEng FL forms each have their own accompanying guidance notes which should be read in conjunction with the Further Learning guidelines. These are all available in this information pack and <http://www.imeche.org/further-learning>

The guidelines describe the requirements in more detail and explain what is meant by Bachelors and Masters level understanding. They also demonstrate different routes available to an applicant looking to undertake Further Learning, i.e. an already accredited masters or an individually planned route. This may include a masters programme not currently accredited; engineering council exams (see [www.city&guilds.co.uk](http://www.city&guilds.co.uk) and [www.engc.org.uk](http://www.engc.org.uk) for details on cost and location of examinations); work based learning; or, combinations of MSc modules with work based learning.

### **How do I get my plan reviewed?**

For any academic modules: send in the full module descriptors, ensuring information covers the expected learning outcomes, methods of assessment, credit weighting and any supporting information, e.g. which MSc course they contribute towards. Please do not send in the module outline as there is not enough information to review the module content. Full descriptors can be obtained from the University direct.

For MSc modules used for CEng FL, ensure they cover an in depth, critical analysis of engineering and science subjects and that they are not just focused on familiarity with hardware; that they are therefore about application, not basic knowledge and understanding.

For any work based learning: clearly specify the duration of the knowledge gain, what knowledge will be undertaken and how. Then, list out the expected learning outcomes along with the assessment method. The guidance note gives further details.

### **Is there any other information I need to supply with the application?**

All applicants that want to undertake an Individual Further Learning Plan should submit X1 copy of the completed submission plus supplementary information to the address on the form (Further Learning, IMechE, 1 Birdcage Walk, London, SW1H 9JJ). Please note that the Further Learning committee that review these applications are not expected to search for evidence to show that the submission is acceptable i.e. web links to show any information are not acceptable, all information that the applicant wishes the committee to review should be attached to/included in the application.

### **How long is the process and what does this consist of?**

The process consists of a postal review. Copies are sent to X3 committee members for their comments and a decision should be available within 2-3 months of submission.

### **Is there any cost for the application?**

There is no cost for a Further Learning Plan assessment and we strongly encourage you to be a member of the IMechE before submitting one to assist us with your progression.

### **How are the applicants notified of their results?**

All applicants are emailed their results approximately 6-8 weeks after submission. Prior to this an email to confirm receipt of application is sent.

### **What are some examples of the results?**

Applicants will be told whether their plan is suitable for further learning. If the Plan is not suitable, comments from the reviewing members will be relayed; these will normally detail which

section of the plan is not currently acceptable and which area needs to be re-submitted or clarified.

**What if I am taking an already approved Company Scheme or MSc?**

All Applicants should notify the membership team of which Further Learning route they are following, and the start date they entered onto the Scheme or MSc. The approved list of Company Schemes and postgraduate programmes is available on the web site. An accredited MSc Programme or approved Company Scheme will fulfill the Further Learning requirements. The IMechE will also accept an MSc that is accredited by another Professional Engineering Institution without the need for further review.

**I am on the MPDS, does this count?**

The MPDS (Monitored Professional Development Scheme) focuses on your professional competence. Further Learning focuses on your knowledge and understanding gained since your first degree. All Further Learning should focus on these aspects. Further Learning should be completed alongside your MPDS. Once both your Further Learning and Professional Competence skills have met the relevant benchmark you can then apply for full Membership and professional registration.

## **SECTION 2: GUIDE TO UNDERSTANDING FURTHER LEARNING**

### **Who does FL apply to?**

- Those without the full exemplifying qualifications as defined by the Engineering Council

### **What are exemplifying qualifications?**

- Incorporated Engineer:
  - Accredited Bachelors or honours degree in engineering or technology
  - BEng/BSc accredited by other institutions are accepted by IMechE
  - or a Higher National Certificate or Diploma or a Foundation Degree, plus appropriate further learning to Bachelors level
  - an approved NVQ4 or SVQ4
- Chartered Engineer:
  - An accredited BEng(Hons) plus an accredited Masters degree or appropriate Further Learning to masters' level
  - Or an accredited integrated MEng
  - MEng programmes accredited by other institutions are accepted by IMechE

### **IMechE's Further Learning must fulfill the QAA benchmark statements by demonstrating knowledge and understanding in the following 2 areas:**

- **1) Deepening of knowledge in Engineering & Scientific subjects:**
  - This is a key component and must be clearly spelled out
  - Must be to Master's level for those seeking CEng and Bachelors for IEng
  - Deeper learning can be gained at work through research, deep level projects and technical reporting; this may be difficult for some engineers to demonstrate early on, and therefore can also be achieved by academic study
- **2) Broadening of knowledge in Non-Technical and technical subjects:**
  - Examples: project management; exploring or researching ethical and legal issues; cost optimisation; cost and quality management; make or buy decisions; product marketing; involvement in customer and supplier relationships etc
  - Expanding on technical knowledge and your understanding of principles of engineering, various use of analytical methods
  - You will prepare academic style reports about learning and knowledge and understanding you have gained - These reports and presentations must be assessed (eg by a CEng Mentor, technical specialist in that area)
  - Through work based knowledge or additional courses and seminars at universities and colleges

## **SECTION 3: CASE EXAMPLES - FURTHER LEARNING**

### **■ Applicant with an accredited BEng (Hons) Degree needing FL for CEng:**

- **Case 1:** BEng (Hons) graduate selects 2 or 3 Masters level modules in Advanced Finite Element Analysis and Advanced Fracture Mechanics plus work based learning, perhaps in cost management of projects, and non-technical broadening, through marketing and supplier involvement.
- **Case 2:** The candidate selects 3 Masters level modules in Advance Control Systems, Systems Modelling and Computer Aided Engineering, plus work based learning through project management roles and computer software packages in the workplace.
- **Case 3:** The candidate selects an MSc Programme. This is submitted for approval, comprising relevant engineering and it may include management topics. Could be completed full time, part-time or via distance learning.
- **Case 4:** The candidate selects a PhD in a relevant engineering subject, so will have met and exceeded the masters level requirements, candidate submits this for content approval.

### **■ Applicant with an accredited HNC/HND/Foundation Degree needing FL for IEng:**

- **Case 1:** applicant enters into the final year of a BEng/BSc programme and submits the content of the final year for approval.
- **Case 2:** Applicant identifies work based learning to bachelors level through on the job training and experience and seminars and identifies this in their further learning plan.

**Case 3:** Applicant completes 3 final year bachelor modules by distance learning from University such as the Open University whilst still working and supports their application with work based knowledge gain.

### **■ Comments:**

- Further Learning is a way to meet the Engineering Council's requirements and ensure adequate mechanical engineering content and knowledge
- By the examples above, you can see that each case is different and that individuals need to identify the most appropriate route for them to show how they have met the academic requirements
- The process of determining Further Learning is quite simple, but because of these individual differences, advice is not generic.

## **SECTION 4: KNOWLEDGE CHECK LIST**

### **Items to include when presenting your Further Learning Plan**

- 1. Further Learning is additional to your usual Initial Professional Development (IPD) or MPDS.**
  - Please show that you understand this when you prepare your plan by distinguishing between them in your plan. Further Learning is about gaining new knowledge and understanding. Professional development is about your competence in an area.
  
- 2. Further Learning must be independently assessed**
  - Please show who will undertake the assessment, for example, a senior industrial person in the company; your CEng mentor; a university lecturer.
  - Show the assessment method, for example: written report if it is work-based learning; or unseen examination, coursework if it is university based study.
  - The assessment criteria must be clearly defined i.e. learning outcomes, which list what knowledge you will have gained to enable you to undertake a specific task.
  
- 3. Provide your mentor or assessor with the assessment criteria**
  - Please give the assessment criteria to the person who will be assessing your work.
  - You must include the criteria in your plan, as this demonstrates that there is a full understanding of what you are being assessed against.
  
- 4. Assessment criteria is for depth and breadth of:**
  - **Technical & Non-technical understanding of the work** (eg MEMS technology Micro-Electro-Mechanical Systems and how they function; the Mechanics of load-carrying members: stress, strain, elastic stress-strain relations, work and energy, boundary-value problems etc).
  - **The development of principles and ideas, and their application to the principles of the work you are undertaking** (eg principles of heat transfer; business strategy; project management tools).
  - **The use of theory** (eg the 5P's or 7P's of marketing; the triangular framework for time/cost/quality; the balanced scorecard; 5 Forces; pest/swot; e-business practice; ERP; CRM; contingency theory; motivation theory; there are many others you could use).
  - **Analytical methods** (eg use of analytical methods; Burgers equation; Navier-Stokes equations; Reynolds stress and mean equations to show how turbulent viscosity may affect the Navier-Stokes equation; NPV for future net cash flow or selection of projects etc.).

## **SECTION 5: PREPARING YOUR INDIVIDUAL PLAN**

- **Prepare an Individual Further Learning Plan:** First of all read the guidelines and guidance note before preparing your plan. Consider which aspects can be covered via work place learning and which aspects are covered from formal courses and study. Insert the work based activity for a demonstration of broadened knowledge in the appropriate place within your Plan. You will need to ensure you have sufficient coverage of different subject areas. Ensure you have identified specific areas of knowledge and understanding that you will gain for the work you are claiming. These will form the criteria for your assessment. All assessments must be formally documented and will be presented in place of a formal academic certificate. If you have completed reports to demonstrate your knowledge and understanding, then the formal documentation can be recorded by your chosen assessor after completing a viva. Simply give your report, along with your identified assessment criteria, to your assessor, then the viva will test your knowledge in the areas identified. Your assessor can then make a formal written assessment and this must be kept with your final completed plan as evidence.

Next, to demonstrate the deepened knowledge in Engineering & Science subjects: if you are using academic study to demonstrate this, add at least 2 masters level MSc modules that you intend to study. Ensure these are deep level modules, where you will gain a deep understanding of a particular subject area, rather than just broadening your knowledge or adding new knowledge to your portfolio. These will obviously be assessed by the university (in the form of grading of coursework, examination or other reporting), but please clearly show the assessment method.

You will nominate your own timeline to complete your Plan. Please ensure this is reasonable. Allow for delays or have a contingency period for things to go wrong. If you are on an MPDS route, let the IMechE know that you need to extend the completion date to coincide with the completion of your Further Learning Plan.

If you later find that you are going to exceed the time you allowed, you must contact IMechE and have any extension approved. This is to protect you, just in case the Engineering Council changes the requirements for further learning. If you don't have the extension approved by IMechE, you will have to meet any additional requirements that may be imposed by the introduction of new 'Standards'.

- **Submit your Plan to the IMechE:** We will forward the plan to the Academic Assessment Committee for review. Please send x1 complete copy. We will email you on their behalf and tell you if your plan is acceptable, or advise if it needs strengthening.

**If you need advice on a preliminary plan:** Put the nucleus of your plan together in a rough layout. Then, make an appointment for a 'surgery' session at the IMechE by emailing [furtherlearning@imeche.org](mailto:furtherlearning@imeche.org) with your plan and contact details. One of our staff will then advise you on the way forward if you feel you need further help. Please allow a period of around half an hour, where you will not be interrupted for your surgery session. We can spend more time with you if we need to, or re-schedule a further session when you have gathered more information (i.e. from employer opportunities for project work; university course material etc). Due to constraints on staff time, unfortunately we cannot search university course material for you.

- **Ensure Learning Outcomes have been identified in the plan:** If identifying a work based project give a summary of the work and knowledge area to be learnt and explain what role and time frame this will be over, then clearly highlight specific areas of knowledge gain that will form the basis of your assessment criteria.

- **Evidence of completing the plan:** The detail in your plan will demonstrate the timeline which you will complete your acquisition of knowledge to complete your plan. When you have completed everything in the approved Plan that you said you would do, send evidence of this to the IMechE. Please do not send assessment sheets individually for each piece of work. We only need to know when the entire plan is completed.

IMechE don't necessarily need to see all the reports, but we will need to see all the signed assessment sheets and assessment comments that confirm your satisfactory completion of each aspect of the plan. IMechE and the Engineering Council can call on further evidence, copies of your reports etc at any time if they are unsatisfied with the assessment process, the qualification of the assessor or for QA monitoring.

- **Proceed to Professional Registration:** Professional Competence must be demonstrable at your professional review. At this time, if you feel you have acquired sufficient professional engineering competence, please apply for full membership and professional registration. You can do a self-assessment of your competence using the application guidance notes from this web link. Download your application and sponsor forms:

<http://www.imeche.org/training-and-professional-development/professional-registration>

Attach your original signed assessment sheets from all Further Learning activities. Remember, these assessment sheets must be completed for each individual element of your Further Learning Plan that forms part of your work based learning activities. We do not need assessment sheets for MSc modules, as these will be assessed by exam and/or coursework by the university. Please provide evidence of the university assessment and results.

We will then make arrangements for your professional review interview, at a location that you will nominate.

**Please remember your further learning and your professional development must both be fully completed before you apply for full Membership and professional registration.**

- For further help, contact the Membership helpline on 0845 226 919 or
- Email [furtherlearning@imeche.org](mailto:furtherlearning@imeche.org)

## **SECTION 6: PLANNING A REPORT FOR FURTHER LEARNING**

The following is an example of how to use work based learning and academic style reports to demonstrate Further Learning. For example, the use of general engineering principles and ideas; introducing relevant theory; showing critical analysis using different methods, processes or outcomes in differing environments, all knowledge that is gained in the work place.

For a Further Learning Report to support knowledge gained in the work place or from a seminar or course attended, you will need to list a summary of the immediate tasks of the job and identify clear learning outcomes - which are skills required to enable the objective to be completed. E.g:

### **Summary**

**"I am working in the automotive and motorsport industry and over the next 3 years will gain work based knowledge in areas such as advanced thermofluids, vehicle testing and dynamics, reviewing model design, whilst taking into account management and financial aspects."**

*After the summary, identify each individual task, you then need to list what learning outcomes will be gained: so for advanced thermofluids:*

### **Knowledge in advanced Thermofluids:**

**Working on a project on automotive design enhancements, I will gain a thorough understanding on advanced thermofluids theory and application. This knowledge will be gained from on the job training, being mentored and having formal company training courses on the subject matter. This knowledge will be acquired over a period of 6 months of intensive learning to understand the foundation basics to assist me with my work. This knowledge will be obtained through formal mentoring from my supervisor consolidating understanding of new ideas and principles and by practical hands on experience by visit to the local college to use the laboratories.**

### **Learning outcomes:**

- **I will understand the principles of measurements of velocity and turbulence quantities using Laser Doppler Anemometry (LDA), Particle Image Velocimetry (PIV), and Hot-wire Anemometry (HWA).**
- **I will gain knowledge in the principles of fluid flow and heat transfer simulations by methods based on Reynolds-averaged Navier-Stokes (RANS) modeling approach, Large eddy simulation (LES) and direct numerical simulation (DNS).**
- **I will learn the various methods used for flow measurement and modeling and be able to explain these to a third party**
- **I will learn how to test and analyse LES problems.**
- **I will learn how to use Hot Wire Anemometry equipment for measurements of turbulence quantities. And further advance my knowledge of CFD software.**
- **I will learn how to critically evaluation various methods, report writing, search of databases**

### **Assessment:**

**The assessment will comprise an academic report on the application of thermo fluids in my day to day work covering the aspects identified in the learning outcomes. The assessment will then comprise of a viva with my Mentor, who has 9 years experience in automotive industry specialising in thermo fluids and he will use the learning outcomes to form the basis of the assessment criteria.**

## SECTION 7: Example Plan

### 5a) Highlighting Engineering and Science Deepening Subjects (i.e. Masters level understanding)

Please detail information on how the following 2 statements will be demonstrated:

- A) *a systematic understanding of knowledge, and a critical awareness of current problems and/or new insights much of which is at, or informed by, the forefront of their academic discipline, field of study or area of professional practice;*
- B) *conceptual understanding that enables an individual to evaluate critically current research and advanced scholarship in the discipline;*

Please summarise how and what will be covered under each heading:

**A)** Completion of module 'Advanced Computer Aided Engineering' from the MSc Advanced Engineering Design delivered at the University of Anytown

**B)** Completion of module 'Design of Advanced Engineering Materials' from the MSc Mechanical and Manufacturing Engineering at the University of Anytown

List below as bullet points, the academic learning outcomes which reflect the knowledge and understanding gained to enable the above section to be completed:

(if claiming MSc modules – please attach full module descriptors ensuring the academic learning outcomes are detailed within them, otherwise please list them here)

A)

- A) Full module descriptor and course outline are attached with this submission which detail the learning outcomes and assessment.

B)

- B) Full module descriptor and course outline are attached with this submission which detail the learning outcomes and assessment.

**Assessment Style and Method:** The Learning outcomes above will form the basis of a viva assessment for work with no formal examination process

- 1) Both modules are evaluated by a combination of assessments and written examination held during a 5 day intensive school week. Both modules are delivered by distance learning mode of study

## 5b) Highlighting Technical Broadening & Non-Technical Broadening Subjects

Please detail information on how the following 3 statements will be demonstrated:

- A) *a comprehensive understanding of techniques applicable to their own research or advanced scholarship*
- B) *originality in application of knowledge, together with a practical understanding of how established techniques of research and enquiry are used to create and interpret knowledge in the discipline;*
- C) *conceptual understanding that enables an individual to evaluate methodologies and develop critiques of them and, where appropriate, to propose new hypotheses.*

Please summarise how and what will be covered under each heading:

**I am working in the automotive and motorsport industry and over the next 3 years will gain work based knowledge in areas such as advanced thermofluids, vehicle testing and dynamics, reviewing model design, whilst taking into account management and financial aspects. This work based knowledge is supported by some in house training.**

A)

1) Knowledge in advanced Thermofluids - Working on a project on automotive design enhancements, I will gain a thorough understanding on advanced thermofluids theory and application. This knowledge will be gained from on the job training, being mentored and having formal company training courses on the subject matter. This knowledge will be acquired over a period of 6 months of intensive learning to understand the foundation basics to assist me with my work. This knowledge will be obtained through formal mentoring from my supervisor consolidating understanding of new ideas and principles and by practical hands on experience by visit to the local college to use the laboratories.

2) Company training School on Engine and Diagnostics – 5 week on the job training followed by 1 week intensive course

3) Supply Chain Management – working with supply chain unit for 2 days a week for 3 months to gain an understanding on strategic, tactical and operational issues relating to management of supply chains.

B)

1) understand vehicle design and performance through work-based knowledge gained over a period of 1 year, working in teams on projects and tasks that focus on racing vehicle designs and performance parameters, Racing vehicles and systems, operation, designs, design principles; Vehicle body and structure; Transmission; Suspension and steering, geometry and loads; Brakes and Braking Systems, Parameters influencing vehicle performance; Performance optimisation. Vehicle safety.

2) Model design requirements – working in my team with 4 other staff members, through my work placement as the design engineer, I will learn the ability to use advanced numerical models for the analysis of complex automotive engineering problems. This will involve formal training on a variety of Computer Aided Engineering Software and Packages such as xyz. This practical and theoretical work will reinforce and increase the awareness of advances and constraints of modern methods of

manufacturing on automotive engineering design.

C)

1) 2 day 'Leadership and Management Skills' course delivered by abc Training Ltd

2) understand the basics and broaden my knowledge through increased responsibility in the skills as a team leader and in control of budgets for projects focusing on aspects such as management positions in engineering organisations. financial ownership issues: financial implications, sources of finance, raising capital, venture finance, merchant banks, mergers, basic HR issues and supported by internal course on motivation in workplace, leadership, incentivisation, employment legislation in UK and continuous improvement.

For each subject area: list below, as bullet points, the academic learning outcomes which reflect the knowledge and understanding gained to enable the above section to be completed:

A)

1)

- I will understand the principles of measurements of velocity and turbulence quantities using Laser Doppler Anemometry (LDA), Particle Image Velocimetry (PIV), and Hot-wire Anemometry (HWA).
- I will gain knowledge in the principles of fluid flow and heat transfer simulations by methods based on Reynolds-averaged Navier-Stokes (RANS) modeling approach, large eddy simulation (LES) and direct numerical simulation (DNS).
- I will learn the various methods used for flow measurement and modeling and be able to explain these to a third party
- I will learn how to test and analyse LES problems.
- I will learn how to use Hot Wire Anemometry equipment for measurements of turbulence quantities. And further advance my knowledge of CFD software.
- I will learn how to critically evaluation various methods, report writing, search of databases

2)

- understand the function of an engine and its components
- understand the operation of the fuel system
- understand the features of the electronic control system
- knowledge in maintenance, fault finding and repair

3)

- understand concept of supply chain management
- understanding in-depth knowledge of supporting IT applications
- learn how to model and critically review the performance and practices of manufacturing and industrial organisations

B)

1)

- understand principles of vehicle systems operation, critical load cases, dimensioning, materials and manufacturing.
- Understand Racing vehicle performance, influencing factors and prediction methods.
- Understand the performance prediction and optimisation for given vehicle and competition.
- Understand how to critically analyse main vehicle systems
- Learn how to specify critical load cases and design racing vehicle components and assemblies

to a third audience

- Be able to predict and optimise racing vehicle performance

2)

- Understand the basic theory of two-dimensional finite element analysis and algorithms necessary for developing different types of elements
- Understand the basic concepts of optimisation theory to the solution of engineering problems
- Understand how to use Computer Aided Engineering Software to organise manufacturing processes, and design artifacts suitable for use or manufacture by my companies specification
- Learn how to develop and use advanced finite element and optimisation models for the solution of work-based problems xyz
- Learn how to work independently and research and apply technical information to the assessment of a practical work based application
- Understand the importance of researching relevant sources of technical literature to assist with new developments and application of knowledge, such as xyz

C)

1)

- learn how to read profit statements and balance sheets
- understand why items are accounted for in different ways
- learn how to use management information and financial reports to understand health of a business
- learn how to evaluate return on investment
- learn how to prepare budgets and forecasting
- understand the financial responsibilities within our budget control and structure
- learn how to apply modern management practices associated with the motivation and incentivisation of a workforce, use of job evaluation schemes, complaints procedures, and remuneration schemes
- understand current employment law,
- gain a basic overview on industrial relations and human rights legislation in UK and Europe.
- Be able to describe the basic key factors associated with modern manufacturing, the systems approach, continuous improvement and organisational strategy.
- Be able to demonstrate and explain relevant sources of ethics and their effect on trade at both local and global level in relation to my work stream

2)

- understand the qualities of good leadership and knowledge of different styles of leadership
- understand different types of motivational skills
- understand and implement strategies for dealing with stress
- learn how to delegate and be an effective manager

**Assessment Style and Method:** - The Learning outcomes above will form the basis of a viva assessment for work with no formal examination process

For all areas listed above, the assessment will be a report detailing the aspects of knowledge and understanding gained. A chosen assessor will read the report and then hold a fifteen minute viva with the applicant, focusing on the learning outcomes detailed above. The assessor's work based learning form will be completed and signed off as evidence of an assessment

A)1) Assessor Name: [Dr P Hall](#) Assessor Position: [CEng Design Manager](#)

List expertise in area being assessed: 9 years experience in thermo fluids and was professor at xy university for 10 years

2) Assessor Name: Mr Colin White Assessor Position IEng Mechanical Engineer  
List expertise in area being assessed: 6 years experience - course trainer and technician Assessor

3) Name: Ms Jane Poole Assessor Position: CEng Project Manager  
List expertise in area being assessed: 4 years experience of supply chain management at senior level

B)1) Assessor Name: Dr Susan Jones Assessor Position: CEng Mechanical Engineer  
List expertise in area being assessed: 8 years extensive experience in vehicle performance and

2) Assessor Name: Eur Ing David Smith Assessor Position: CEng Head Technical Director  
List expertise in area being assessed: 10 years extensive knowledge in design applications

C) 1) Assessor Name: Mr Paul Oat Assessor Position: Finance Manager  
List expertise in area being assessed: 15 years experience

2) Assessor Name: Mrs Claire Turner Assessor Position: HR Manager will hold viva to assess learning outcomes. – will also gain attendance certificate  
List expertise in area being assessed: 9 years experience (please use additional sheets as necessary)

### **Additional Features of your Further Learning**

Are there any other features of your Further Learning that you would like to bring to our attention in support of your application?

*Please ensure your Further Learning Plan clearly focuses on new academic learning outcomes which demonstrate knowledge and understanding and not your professional development/competence.*  
As already referenced within the plan, I have been working for 1.5 years as a graduate design engineer in the automotive industry. I am due to complete the Graduate Training Scheme and am enrolled on the IMechE accredited Monitored Professional Development Scheme (MPDS). Through work based projects and some formal academic study, I feel my combination of learning both broaden and deepens my knowledge as described in the learning outcomes above. Covering a range of both pure engineering topics aligned to my career and supportive financial and management skills.

Signature of Applicant

**Able Engineer**

Date

**01/06/09**

## **SECTION 8: ASSESSMENT OF WORK-BASED LEARNING**

### **THIS FORM IS USED BY ASSESSORS ONLY**

'Further Learning' is required for those who do not meet the Engineering Council exemplifying academic qualifications for a Chartered (CEng) or Incorporated Engineer (IEng).

**Assessors:** Further Learning can be assessed by senior persons in the company; technical specialists; mentors; those with experience of being a visiting lecturer, industrial adviser etc. Generally you will be viewing academic style reports and peer review presentations that demonstrate actual learning outcomes, together with knowledge and understanding gained.

#### **AREA OF FURTHER LEARNING ASSESSED: highlight area**

Technical Broadening  Non-Technical Broadening  Engineering & Science Deepening

**TYPE OF EVIDENCE PRESENTED: REPORT  PRESENTATION  OTHER**

(cut and paste section 5A & 5B of the 'Further Learning Plan' to form the basis of the viva assessment)

Subject areas being claimed:

Academic learning outcomes which reflect the knowledge and understanding gained to enable the above section to be completed: (these will form the basis of a viva assessment for work with no formal examination process):

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- 
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- 

#### **Comments on viva assessment:**

(Where appropriate, please elaborate on technical knowledge & understanding, development of principles and ideas, use of theory, exploring analytical methods, broadening of knowledge and general understanding).

**Applicants Name:**

**IMechE Member No:**

**Assessor's Details** (\*Prove full name/Qualifications/Job Title):

**Date of Assessment:**

**Assessor's email address and Telephone contact no:**

**Signature of Assessor:**

*This is an electronic form and the text boxes are expandable so that applicants/assessors should not be inhibited by the displayed size of the text box. We should emphasize that the entries should be clear and as extensive as necessary to convey the meaning unambiguously to a reader without knowledge of the context of the "study"*

## Example: Assessment of evidence

APPENDIX 3 of FL Guidelines – April 2008

### FURTHER LEARNING ASSESSMENT OF WORK BASED LEARNING

#### THIS FORM IS USED BY ASSESSORS ONLY

'Further Learning' is required for those who do not meet the Engineering Council<sup>UK</sup> exemplifying academic qualifications for a Chartered (CEng) or Incorporate Engineer (IEng).

**Assessors:** Further Learning can be assessed by senior persons in the company; technical specialists; mentors; those with experience of being a visiting lecturer, industrial adviser etc. Generally you will be viewing academic style reports and peer review presentations that demonstrate actual learning outcomes, together with knowledge and understanding gained.

#### AREA OF FURTHER LEARNING ASSESSED: highlight area

Technical Broadening  Non-Technical Broadening  Engineering & Science Deepening

TYPE OF EVIDENCE PRESENTED:  REPORT  PRESENTATION  OTHER

(cut and paste section 5A & 5b of the 'Further Learning Plan' to form the basis of the viva assessment)

#### Subject areas being claimed:

GSA Software Course – Complete GSA training course which will teach the functionality of the structural analysis software GSA. The training course will form a grounding in which the software can be used in the analysis of simple Overhead Line Equipment (OLE) supporting structure and foundation calculations as part of OLE design.

Academic learning outcomes which reflect the knowledge and understanding gained to enable the above section to be completed: (these will form the basis of a viva assessment for work with no formal examination process):

- Understanding of techniques used for building models
- Analysis options and reports available
- Build on training course to apply GSA to an OLE structure and compare the results to those obtained using a traditional calculation method.

#### Comments on viva assessment:

has produced a well presented report set out in a logical manner. has considered the use of GSA for a relatively simply model and completed a set of hand calculations for verification of the GSA output.

This exercise has given a good understanding of how a structure is modelled and the logical steps and checks that must be undertaken for even the most simple of models. Following this process has allowed him to understand how assumptions and simplifications need to be applied to an analysis model to reasonably allow it to represent the real structure being considered. This understanding will allow him to generate more complex models successfully in the future by following the same principles.

By adopting good practice and the verification procedures followed has identified that there are some differences between the output of the GSA model and the verification calculations. He has identified this and rightly noted that this does require further investigation, which it does. Through discussion I am confident that would be able to move this through to the next level should the need be required.

In conclusion this report is well presented and has allowed to demonstrate that he understands the problem in sufficient detail for the exercise completed and it has been a good introduction to GSA software for him.

## FURTHER LEARNING ASSESSMENT OF WORK BASED LEARNING

### THIS FORM IS USED BY ASSESSORS ONLY

'Further Learning' is required for those who do not meet the Engineering Council<sup>UK</sup> exemplifying academic qualifications for a Chartered (CEng) or Incorporated Engineer (IEng).

**Assessors:** Further Learning can be assessed by senior persons in the company; technical specialists; mentors; those with experience of being a visiting lecturer, industrial adviser etc. Generally you will be viewing academic style reports and peer review presentations that demonstrate actual learning outcomes, together with knowledge and understanding gained.

#### AREA OF FURTHER LEARNING ASSESSED: highlight area

Technical Broadening  Non-Technical Broadening  Engineering & Science Deepening

TYPE OF EVIDENCE PRESENTED:  REPORT  PRESENTATION  OTHER

(cut and paste section 5A & 5b of the 'Further Learning Plan' to form the basis of the viva assessment)

#### Subject areas being claimed:

I will attend a training course for P3e software. This will allow me to gain a better understanding of the industry standard planning tool and how to use it. It will also give me an introduction to programme and resource management available within the software. This will enable me to better understand the plans used by project managers and understand interdisciplinary interfaces within the plans and the effect my work can have.

Academic learning outcomes which reflect the knowledge and understanding gained to enable the above section to be completed: (these will form the basis of a viva assessment for work with no formal examination process):

- Course content and certificates attached with Further Learning Plan
- Knowledge of P3e planning software to create robust plans using relationships, lags and constraints.
- Understanding of advanced functions such as resource levelling and financial support tools.
- Knowledge of reporting options and customisation available.

#### Comments on viva assessment:

(Where appropriate, please elaborate on technical knowledge & understanding, development of principles and ideas, use of theory, exploring analytical methods, broadening of knowledge and general understanding)

██████████ has prepared a very good report on his experiences with Primavera P3.e software. As he has said, Primavera have, for over 20 years, supplied high-end, industry standard project management and planning software, capable of supporting projects and tasks at all levels of complexity, in all areas of project management, in design / construction and general business fields. With the arrival of P3.e (developed now to P6) in 2000 and its server / database *modus operandi* and greatly expanded capability, it is now possible to support all aspects of a whole enterprise / business including budgets, resources, asset management and capital projects. ██████████ has realised this and, in learning how to operate the software, has noted the software's flexibility and applicability to areas outside his normal remit.

He worked with a contractor earlier in his career and used the software in the implementation / construction of railway works and interfacing with design production. ██████████ has used it for planning the production of design deliverables (principally for overhead line electrification within the railway industry disciplines) with regard to:

- Task durations



## **SECTION 9: EXAMPLE OF APPROVED INDIVIDUAL FURTHER LEARNING ROUTES**

*Please note: the actual FL Application Form must detail all the expected learning outcomes, the mode of assessment, and the content and level of all work included for both work based learning or taught modules. All MSc modules must have the full module descriptor sent in with the application form to be assessed. Please see the sample plan for the level of detail required.*

All applicants for full membership and professional registration who have undertaken an individual route for further learning will be expected to demonstrate that they have a significant understanding in the following areas:

- Deepening of engineering and scientific knowledge – to masters level knowledge
- broadening of technical & non technical knowledge, - to bachelors level

The IMechE does not intend to attach any quantitative values to the parameters but will assess each application individually to determine whether it contains sufficient and relevant further learning. General guides are detailed in the application 'guidance note'.

### **Examples of approved formats for Engineering and Science Deepening:**

#### **Engineering and Science Deepening:**

- Two modules "Hydrogen and Fuel Cell Technology" and "Biomass and Waste Technology" from the MSc Renewable Energy Flexible Training Program at the University of Newcastle satisfy the Engineering & Science Deepening criteria.
- The two modules 'Structural Analysis' and 'Thermofluids' from the MSc in Mechanical Engineering at the University of Loughborough satisfy the Engineering & Science Deepening criteria.
- Two Masters level modules from Warwick University in 'Advanced Materials & Processes' and 'Automation & Robotics' satisfy the Engineering & Science Deepening criteria.
- Two masters level modules fro Glasgow Caledonian University in 'Computer Aided Mechanics' and 'Applied Thermofluid and Computational Fluid Dynamics' satisfy the Engineering & Science Deepening criteria
- Two masters level modules from MSc Mechanical and Automotive engineering in 'Advanced Mechanical Analysis' and 'Composite materials structures' from Huddersfield University satisfy the Engineering & Science Deepening criteria.

### **Engineering Council Exams**

The Further Learning Committee has agreed that selection of modules chosen and the project topic described following the completion of Engineering Council exams to gain the PgD award (run by City and Guilds) will meet the Further Learning requirements. At this stage, the IMechE do not specify time frames to complete the PgD or the number of times a module can be retaken.

**Example of approved entire plan – to give an indication of combinations of modules and work based learning that may count for an entire plan to be approved.**

**Engineering and Science Deepening:**

The Committee has accepted the MSc module Advance Materials Processes from Glasgow Caledonian University plus the following Work Based Learning and Training as demonstrating a deepening of your knowledge in Engineering and Science:

- ‘Sulphur Recovery Units/Anime Plants’ Subject Matter Expert Course from company – 4 Days
- ‘Hydrogen Manufacturing Plants’ Subject Matter Expert Course from Company – 3 Days
- ‘Catalytic Reforming’ Subject Matter Expert Course from Company including:
  - Corrosion and Catalytic Reformers
  - Metallurgy, Refractory, and Mechanical Considerations
  - Component Considerations in Catalytic Reformers

**Broadening of Knowledge:**

The Committee has accepted the following Work Based Learning, Training and Academic Studies as demonstrating a broadening of your technical and non technical knowledge:

- ‘Storage Tanks Assessors Course (including EEMUA 159) from The Welding Institute
- Welding Inspectors Course (CSWIP 3.1) Level 1 and 2 from The Welding Institute
- ‘Furnaces’ Subject Matter Expert Course on Fired Heater Units from Company – 3 In-Service Plant Inspection’ Course from COMPANY – 4 Days
- ‘Pressure Equipment Directive (PED)’ Course from Company – 60 Hours
- ‘Practical Refractories’ work based learning gained at company– 60 Hours
- ‘Project Management’ module from the MEng at Open University
- ‘Radiation Protection Supervisor’ Course from Company – 3 days
- Work based learning in ‘Fluid Catalytic Cracking Process’ to include areas such as
  - Corrosion and the FCC Process
  - Metallurgical and Refractory Considerations in FCC Plants
  - Corrosion and Metallurgical Deterioration in FCC Plants
- Work placement over 3 weeks focusing on ‘Infrared Thermography