KNOWLEDGE ASSESSMENT SELF REVIEW (FORM KA02)

Name of Applicant: _____ **Membership number or date of birth:** 31st/10/1981

Section One

Important Instructions and Guidance

Carefully read the following instructions and guidance. They are designed to assist you in providing in providing a portfolio of evidence that best demonstrates the comprehension and application of your engineering knowledge to Washington Accord equivalence.

Section One – Instructions and Guidance

- Familiarise yourself with the definition of '*complex engineering problems'* (Appendix One) as you are required to demonstrate you can apply your engineering knowledge to solve complex engineering problems.
- Identify the '*engineering discipline and field'* (Appendix Two) you will provide evidence of your comprehension and application of engineering knowledge in.
- The knowledge assessment is based on Washington Accord knowledge profile. This form is designed to capture information to assist the evaluation of your evidence

Section Two – Knowledge Profile

- As you do not have a formal engineering qualification that formally benchmarks to a Washington Accord accredited degree, it is essential that you demonstrate that you have acquired an equivalent level of knowledge.
- The Context and performance indicators provide guidance on the evidence to be provided
- Consider each element of the knowledge profile, including the context statements and performance indicators. Summarise key aspects of your knowledge under each element and how this has been developed through academic study, on-job learning and/or continuing professional development. It is important you use the performance indicators and complexity definitions to enable you to describe your knowledge and how it has been developed.
- When describing how your educational program contributed to your development, focus on the more advanced pieces of work you did, the knowledge you needed in order to perform that work, and the abilities you needed in order to apply your knowledge in an engineering context.
- The word document is formatted to allow you expand a text box if required.
- Write your material in the first-person using 'I' or 'me' instead of 'we' or 'us'. This makes it easy for the assessors to see what your personal contribution was.

Section Three – Evidence of Application of Knowledge

- Describe 3-4 engineering projects or activities (Work/Study Episodes) that you have been involved with, which demonstrate your ability to apply your engineering knowledge to solve complex engineering problems. Think of activities where you have had to apply a high level of engineering knowledge – such as some analysis that you have done, work you have done in scoping a problem and then developing a solution or design. What engineering models did you use? What assumptions were made in the development of the model and how did you test the model was relevant in the way you used it?
- For engineers with limited practical experience post-graduation, project work undertaken during your study is likely to be one of the best ways of illustrating the application of your knowledge. As well as projects conducted within university or college, you may be able to draw on any industry experience required as part of the educational program.
- You are required to include actual samples of your work – calculations, analyses or reports that you have personally undertaken - to substantiate your work/study episodes.
- Write your material in the first-person using 'I' or 'me' instead of 'we' or 'us. This makes it easy for the assessors to see what your personal contribution was.
- The word document is formatted to allow you expand a text box if required.

Section Four – Supplementary Evidence

- You are required to submit a certified copy of your academic transcript(s) (formal record of papers taken and grades received) if you have not submitted to IPENZ already.
- Summarise your work history but include a representative sample of specific engineering projects or activities that evidence the development or application of the knowledge profile.
- Rather than listing all your CPD activities, provide details of those activities that have extended your professional engineering knowledge in your discipline and field and have assisted you to develop the knowledge profile of a professional engineer. A summary of all relevant activities – including those going beyond the most recent 6 years - will assist knowledge assessors in assessing your engineering knowledge. Assessors will be looking for how any gap between your qualification and a Washington Accord qualification has been bridged by your CPD.
- The word document is formatted to allow you expand a text box if required.

Section Five – Payment

- The fee for a knowledge assessment is NZ$1,351.25 GST incl. Please complete your credit card details.
- Send all documentation to address advised

What happens next?

The knowledge assessor will review your portfolio of evidence to determine the need for further challenge tests. This will involve an interactive assessment, that you will need to make yourself available for, either via tele or video conference and may also involve a series of challenge tests that may include one or a combination of:

- an oral and/or written examination
- a work simulation
- a case study

Your knowledge assessor will be in touch with you to discuss the next steps.

SECTION TWO – KNOWLEDGE PROFILE

ELEMENT ONE

A systematic, theory-based understanding of the natural sciences applicable to your discipline (e.g. calculus-based physics)

Context

All engineering fields are rooted in one or more of the natural sciences. In a broad context, natural science is separated into physical and biological sciences. Physical sciences include chemistry, calculus-based physics, astronomy, geology, geomorphology, and hydrology. Biological sciences involve living systems and include biology, physiology, microbiology, and ecology.

Washington Accord graduates are expected to be able to apply this knowledge of the natural sciences to solve complex engineering problems in their discipline.

Performance Indicators

- Fundamental quantitative knowledge underpinning nature and its phenomena.
- Knowledge of the physical world including physics, chemistry and other areas of physical or biological science relevant to your discipline
- Knowledge of key concepts of the scientific method and other inquiry and problem-solving processes;
- Application of knowledge from one or more of the natural sciences to the solution of complex engineering problems relevant to your discipline.

Summarise your knowledge of the natural sciences relevant to your discipline and how it has been developed through formal study, on-job learning and/or continuing professional development.	**Provide annotations to your supplementary evidence (document and page number)**
Note: please cross reference to your academic transcript(s) and continuing professional development records, as appropriate. During my Industrial Engineering degree from Girne American University, I learned various subjects which played a significant role in obtaining the required engineering skills. I worked on planning and directing various projects along with the team for obtaining the best results. Moreover, I studied and applied physics knowledge in the projects which I undertook during my engineering degree. I also supervised various proposals while working as Senior Planning and Performance Engineer for obtaining the definite engineering reports. I analysed and supervised the Planning section in the project with constant contribution made in the project management domain. I carried out the project planning, scheduling, drawing cost estimates and judiciously deploying manpower, machines and material resources to optimize overall efficiency. Moreover, I assessed competency for all planners, schedulers and trainees as department assessor.	1-Bachelor degree transcript, preparatory year 2003. 2-Resume

ELEMENT TWO

Conceptually-based mathematics, numerical analysis, statistics and formal aspects of computer and information science to support analysis and modelling applicable to your discipline

Context

Branches of mathematics applied in engineering include arithmetic, algebra, geometry, trigonometry, calculus, differential equations, numerical analysis, optimization, probability and statistics, simulation, and matrix theory. Engineers apply mathematics in a wide variety of functions typically carried out in engineering organisations such as planning, design, manufacturing, construction, operations, finance, budgeting, and accounting.

Washington Accord graduates are expected to be able to apply this mathematical knowledge to solve complex engineering problems in their discipline.

Performance Indicators

- Knowledge of mathematics, statistics and numerical methods that supports the development or application of models that replicate 'real world' behaviours
- An understanding of the assumptions behind theoretical models and their impacts in the development and use of those models
- Ability to organise and analyse a data set to determine its statistical variability;
- Knowledge of trigonometry, probability and statistics, differential and integral calculus, and multivariate calculus that supports the solving of complex engineering problems
- Ability to apply differential equations to characterize time-dependent physical processes

Summarise your mathematical knowledge relevant to your discipline and how it has been developed through formal study, on-job learning and/or continuing professional development. Note: please cross reference to your academic transcript(s) and continuing professional development records, as appropriate. • During my Engineering degree, I studied various subjects which included mathematics, physics and statistics. • I applied contextual understanding related to numerical models when undertook the projects in my engineering degree.	**Provide annotations to your supplementary evidence (document and page number)** 1-Bachelor degree transcript, preparatory year 2003.

ELEMENT THREE

A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline

Context

Engineering fundamentals provide the knowledge base for engineering specialisations and represent a systematic formulation of engineering concepts and principles based on mathematical and natural sciences to support applications.

The core areas of engineering fundamentals knowledge include fluid mechanics, statics and dynamics, electric circuits, solid mechanics, thermodynamics, heat transfer, mass transfer, and properties of materials.

Washington Accord graduates are expected to be able to apply this knowledge of engineering fundamentals to solve complex engineering problems.

Performance Indicators

- Ability to define key factual information in core areas of fundamental engineering knowledge relevant to your engineering discipline
- Evidence of sufficient depth of knowledge of engineering fundamentals to demonstrate an ability to think rationally and independently within and outside a chosen field of specialisation
- Evidence of sufficient breadth of knowledge of engineering concepts and principles to allow subsequent professional development across a broad spectrum of engineering
- Ability to apply knowledge of engineering fundamentals to solve complex engineering problems relevant to your discipline

Summarise your knowledge of the core engineering fundamentals (as listed above) and how they have been developed through formal study, on-job learning and/or continuing professional development.

Note: please cross reference to your academic transcript(s) and continuing professional development records, as appropriate.

- I made sure to learn the mechanics of engineering which was followed with other Industrial Engineering related subjects and it assisted well in comprehending my technical knowledge in the projects.
- I applied fundamental engineering concepts in the project which were linked with thermodynamics, material engineering and other related engineering aspects.
- I worked on understanding the planning engineering concepts which worked well in obtaining the overall results related to the work.
- Moreover, I maintained coordination with the project team & all internal/external parties to freeze the technical parameters/ work scope to iron out any ambiguities.
- I managed the resources to create estimates for the project, work breakdown structure, project plan, contingency plan & schedules and identifying risks within time and cost constraints.
- I identified, developed and implemented initiative related to operational excellence.

Provide annotations to your supplementary evidence (document and page number)

1-Bachelor degree transcript, preparatory year 2003.

2-Resume

ELEMENT FOUR

Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline

Context

In addition to a broad understanding of fundamental engineering principles, professional engineers are required to develop specialised engineering knowledge to support their practice. This may be aligned with traditionally defined fields of specialisation such as structural, industrial or geotechnical engineering; coherent combinations of such traditional areas; or more recently emerging fields such as software, biomedical or mechatronics engineering.

Advancing technological knowledge and complexity means that technical specialisation is increasingly necessary for an engineer to remain abreast of technological development throughout their career.

Washington Accord graduates are expected to be able to apply this engineering specialist knowledge to solve complex engineering problems.

Performance Indicators

- Evidence of sufficient depth of knowledge to support practice within one or more recognised field of engineering
- Evidence of a systematic understanding of the coherent body of knowledge related to a particular field of engineering; its underlying principles and concepts; its usage and applications; and analytical and problem solving techniques
- Ability to apply specialist engineering knowledge to solve complex engineering problems

Summarise your specialist engineering knowledge and how it has been developed through formal study, on-job learning and/or continuing professional development. Note: please cross reference to your academic transcript(s) and continuing professional development records, as appropriate.	**Provide annotations to your supplementary evidence (document and page number)**
As a Senior Planning & Performance Engineer, I lead and motivated workforce and monitored their efforts to achieve highest individual and team productivity. I initiated continuous improvement concept to enhance working practices, procedures and machine performance. I worked on implementing preventive, planned & predictive maintenance and driving continuous improvement. I managed safety issues while supervising the site to ensure that all the safety parameters are complied with to assure safety of the employees. I executed cost saving techniques/measures and modify the system as & when necessary to achieve substantial reduction in O&M expenditure. I assisted in the budgeting activity of the plant and managing all financial activities. I coordinated and followed up on maintenance contracts and contractual obligations assigned to planning along with respective concern engineers; recommending payment against respective budget & cost codes with cost control engineer.	1-Resume

ELEMENT FIVE

Knowledge that supports engineering design.

Context

The design process – the root of engineering – is the process of devising a system, component or process to meet desired needs. Engineering design is a systematic process that involves problem definition and scoping, research, analysis, option development and selection, modelling to predict future performance, detailed design and testing. Importantly, it also involves communication of the outcome in a way that enables the design solution to be realised.

Washington Accord graduates are expected to be able to apply this knowledge of the design process to solve complex engineering problems.

Performance Indicators

- Ability to undertake research and analysis to support the design process
- Ability to investigate a situation or the behaviour of a system and identify relevant causes and effects
- Ability to develop from first principles and construct mathematical, physical and conceptual models of situations, systems and devices, with a clear understanding of the assumptions made in development of such models
- Application of technical knowledge, design methods and appropriate tools and resources to design components, systems or processes to meet specified criteria
- Ability to analyse the pros and cons of alternative design options to support the development of an optimised design alternative
- Ability to analyse the constructability or manufacturing feasibility of a project or product
- Experience of personally conducting a significant design exercise, providing evidence of the consideration of various realistic constraints, such as safety, reliability, ethics, economic factors, aesthetics and social impact.
- Ability to apply appropriate design methods in solving complex engineering problems

Summarise your knowledge that supports engineering design relevant to your discipline and how it has been developed and applied through formal study, on-job learning and/or continuing professional development. Note: please cross reference to your academic transcript(s) and continuing professional development records, as appropriate.	**Provide annotations to your supplementary evidence (document and page number)**
• I worked on studying the mechanical drawings which were done using computer aided drawing tool. I worked on studying machine design elements with the in-depth research being conducted on the operation research, production planning and control.	1-Bachelor degree transcript, 2003
• I managed project development from beginning to end. Defined project scope, goals & deliverables that support business goals in collaboration with senior management and stakeholders. I planned the execution of maintenance activity, observed standard procedures for maintenance & considerably reduced down time. Moreover, I ensured plant safety and observed physical conditions of work & work practices and implemented preventive, planned and predictive maintenance to maximize uptime of equipment& installations.	2-Resume

ELEMENT SIX

Knowledge of engineering practice in the engineering discipline

Context

Engineers require knowledge of a broad range of tools and techniques relating to technical (measurement, modelling, drawing, design), business (financial management, project management) and interpersonal (communications, teamwork) aspects of modern engineering practice.

Washington Accord graduates are expected to be able to:

- Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering problems, with an understanding of the limitations.
- Apply knowledge of management principles and economic decision making as part of the management of engineering projects
- Function effectively as an individual and as a member or leader in diverse teams
- Communicate effectively with both technical and non-technical audiences

Performance Indicators

Tools and technologies:

- Awareness of critical issues affecting current technical and professional practice
- Awareness of current tools of analysis, simulation, visualisation, synthesis and design, particularly computer-based models and packages, and competence in the use of a representative selection of these
- Appreciation of the accuracy and limitations of such tools and the assumptions inherent in their use
- Knowledge of materials and resources relevant to the discipline and their main properties and ability to select appropriate materials and techniques for particular objectives
- Knowledge of a wide range of laboratory procedures relevant to the discipline and a clear understanding of the principles and practices of laboratory safety
- knowledge of current types of systems, equipment, information technology, and specifications that accomplish specific design objectives

Communication:

- write correspondence that clearly and concisely communicates facts and circumstances related to a project, product or process
- plan, prepare and deliver an oral presentation, with appropriate visual aids and other supporting materials
- communicate effectively with both technical and non-technical individuals and audiences

Engineering management principles and economic decision making:

- apply appropriate tools and techniques to monitor project schedules and costs

Team work:

- Operate as an effective team member or leader of a multidisciplinary team

ELEMENT SIX

Knowledge of engineering practice in the engineering discipline

Summarise your knowledge in each of these core areas underpinning engineering practice and how it was developed through formal study, on-job learning and/or continuing professional development. Note: please cross reference to your academic transcript(s) and continuing professional development records, as appropriate.	**Provide annotations to your supplementary evidence (document and page number)**
• I maintained proper documentation / records of control and review of maintenance, repairs, additions, changes and modifications also ensured all repair and maintenance work was carried out in a safe and professional manner and that machinery and equipment were available for use at all times. • I worked on creating job specifications and job scope for development of contracts and assisting in the evaluation of bids received. I coordinated and followed up on maintenance contracts and contractual obligations assigned to planning along with respective concern engineers; recommending payment against respective budget & cost codes with cost control engineer. • I ensured periodic and preventive maintenance is appropriately scheduled & accomplished and emergency troubleshooting & maintenance support are readily available and it was followed with the development of various computerized reports on work order back log, manpower and material utilization and maintenance performance indices.	1-Resume

ELEMENT SEVEN

Comprehension of the role of engineering in society and identified issues in engineering practice in the discipline: ethics and the professional responsibility of an engineer to public safety; the impacts of engineering activity: economic, social, cultural, environmental and sustainability

Context

Engineers design artefacts (facilities, structures, systems, products and processes) that are intended to meet a societal need, but which typically impact on individuals or groups in different ways. As a result, design and decision making processes must take account of often conflicting stakeholder needs. An understanding of this societal context and the ethical obligations that the engineer has in service of society are critical components of engineering practice.

Washington Accord graduates are expected to be able to:

- Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice
- Understand and evaluate the sustainability and impact of professional engineering work in the solution of complex engineering problems in societal and environmental contexts.

Performance Indicators

- Demonstration of ethical behaviour in accordance with ethical codes of conduct and established norms of professional conduct
- Evidence of making ethical decisions and regulating one's own professional conduct in accordance with a relevant code of ethical conduct
- Implementation of appropriate health and safety practices
- Application of safe practices in laboratory, test and experimental procedures
- Awareness of the social and environmental effects of their engineering activities
- Awareness of sustainable technologies and sustainable development methodologies
- Ability to identify risks as a consequence of engineering compromises made as a result of project or business constraints, and understanding of techniques to mitigate, eliminate or minimise risk
- Knowledge of appropriate risk management techniques used to assess the accuracy, reliability and authenticity of information
- Understanding of the role of quality management systems tools and processes

Summarise your knowledge of the role of engineering in society and how it has been developed through formal study, on-job learning and/or continuing professional development. Note: please cross reference to your academic transcript(s) and continuing professional development records, as appropriate.	**Provide annotations to your supplementary evidence (document and page number)**
While implementing my duties as Senior Planning and Performance Engineer, I followed the societal conduct which worked in an effective manner for obtaining the timely work results in a defined time period. I applied an adequate analysis which were mainly obtained from the earned engineering degree and this was significantly utilized while executing my duties in the project. I significantly utilized my engineering expertise	1-Resume

in the project and it had direct impact on the society which was linked with the project implementation. As an Engineer, I always made sure to fulfil the following requirements: • Ethical attitude. • Client and Public Welfare and Safety. • Completion of Legal Liabilities. • Communication. • Maintaining Quality Standards.	

ELEMENT EIGHT

Engagement with selected knowledge in the research literature of the discipline

Context

Research and broader lifelong learning capabilities are essential if the engineer is to remain up-to-date with rapidly evolving scientific knowledge, technology and engineering tools critical to engineering practice

Washington Accord graduates are expected to be able to use research-based knowledge and research methods as part of the investigation of complex problems in their discipline

Performance Indicators

- Advanced knowledge in at least one area within your discipline, to a level that engages with current developments in that area
- Understanding of how new developments relate to established theory and practice and to other disciplines with which they interact
- Describe advancements in engineering research and technology and science in a particular area of engineering practice;
- Review research articles pertaining to a project component typically encountered in a specific area of engineering design;
- Choose topics most appropriate for continuing education to increase depth of technical knowledge pertinent to the specific area of engineering practice
- Commitment to lifelong learning.

Summarise your research knowledge and how it has been developed through formal study, on-job learning and/or continuing professional development. Note: please cross reference to your academic transcript(s) and continuing professional development records, as appropriate. I performed planning function for work orders related to daily work priorities, estimation of plant maintenance (rotary & static) equipment. Spearheaded activities pertaining to shutdown, estimation of manpower & material required for major turnaround & assisted Planning Engineer for reservation of material and preparation of shutdown schedules on primavera software. I provided technical inputs like work/job step details, estimated resources like manpower, equipment, cost and duration in preparation of technical work scopes and to assist in preparation of contract document. I analysed data from Maximo, guide field engineers & supervisors to acquire the target set by senior management for maintaining KPI's like manpower, work requests, backlog, preventive maintenance and maintenance cost. I obtained pivotal participation in major Turnaround and warranty shutdowns such as: Condensate Plant Turnaround 2006, Gasoline Plant Warranty shutdown 2007, Condensate Plant turnaround 2010, Gasoline Turnaround 2010, Green Diesel plant warranty shutdown 2013.	**Provide annotations to your supplementary evidence (document and page number)** 1-Resume

Section Three - Evidence of Application of Knowledge

In this section you are required to provide evidence of the application of your engineering knowledge using 3-4 engineering projects or activities (Work/Study Episodes) that you have been involved with.

Provide a general overview of the scope or parameters of each project or activity, your role in it and the particular challenges or complexities involved. Then describe, in narrative form, how it provides evidence of the application of different aspects of your engineering knowledge. Cross reference to the relevant elements of the knowledge profile in the right hand column.

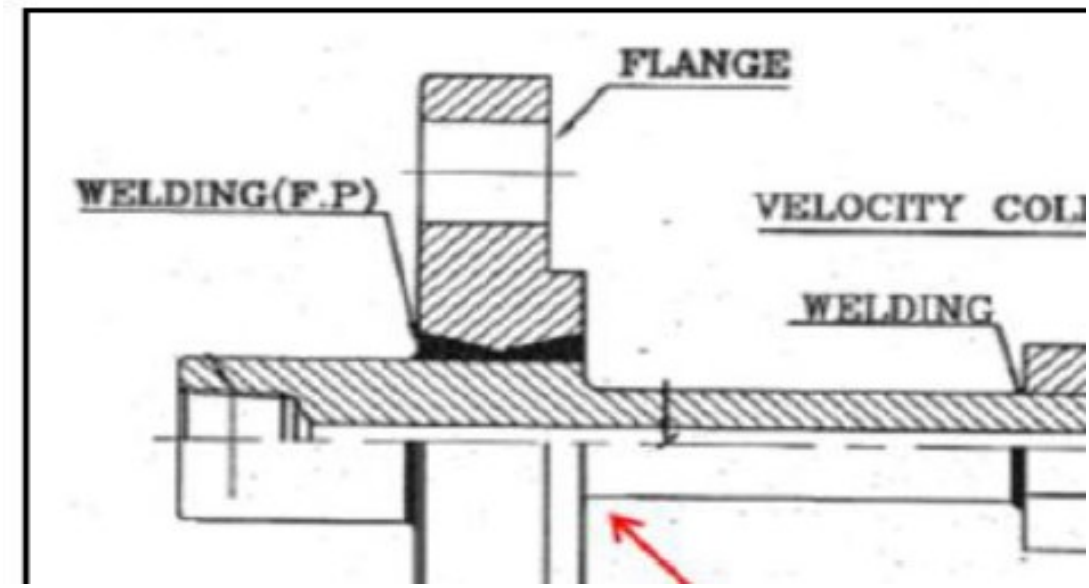
You are also required to complete the Knowledge Matrix to summarise the contribution to knowledge demonstration made by each project. The work/study episodes are expected to provide at least 2 examples of the application of each knowledge element.

Work/Study Episode 1	Element
Overview of the project: CDU Block Shutdown A short shutdown of RR west units was taken for CBDC-RRW ICS integration and 1100B001A & B Crude heaters 24 Nos. of thermo-wells replacement with newly modified design as a part of HAZOP study for increasing CDU Unit throughput from 100% to 105%. To utilize this opportunity, CDU units leaky/stuck XEIVs/XVs servicing at vendor workshop & other miscellaneous jobs were planned during shutdown.	**Three**
Your role and responsibilities: • I conducted effective planning and steered pre-shutdown meetings with all stakeholders for clarity of scope and arranged all required resources accordingly. • I worked on expeditious coordinated to & fro transportation of valves from RRW through M/s Micro transportation. • I actively supported from RSI & RRE manpower. • I additionally provided dynamic support from Local MTC staff/developer. • I executed the major repair which was expected of 1100XEIV340 (30" x 150 – Ball valve) due to leak, however during servicing of XEIVs/XVs in the OEM workshop, no major abnormality was found.	**Four**
The planned and additional job statistics are underneath:	

S.NO.	Requested Jobs Statistics
1	Job Planned in shutdown
2	Additional jobs* completed during shutdown

Nos of leaky thermo-well 1100TI296A & 1100TI326J along with other 22 nos. of existing thermo-wells replaced with newly modified designed.

- Circumferential crack was observed in the leaky thermo-well pipe near flange area due to under design rated velocity at this location as per OEM.



Four

Six

Complexities (using the complexity definitions) and challenges of the project

Huge quantity of dirty & deposited process material was found inside the valve.
Graphite gaskets were found in dries condition and stem was stuck due to deposited material trapped and dried between stem and bonnet.
Seats and ball were badly scratched due to presence of solid particles. Clear signs of indentation were found on the ball surface.

Seven

All valves components have been duly cleaned & polished; where applicable, soft seat inserts have been refurbished to get again the original tightening performance of seats against the ball.
For metal seated valves (1110XV202 & 1100XEIV340) indentation signs were lapped to remove at the utmost the asperity to try to get the tightening performance. All soft sealing parts changed with new ones. Actuator's cylinder cleaned & polished. O-rings changed accordingly. All bare stem valves torque test measurement done & actuators tuning/stroke tests were carried out with satisfactory results.

Four

In the unit # 1300, loose bolts were found on the platform of scaffold provided for the PSA system (1300-ME-001-D1C / D1E) in order to remove the spool joints. This poses potential slip/trip hazard and fall of material hazard. I advised the area supervisor to ensure for the necessary removal of such spare items on the working platform in order to avoid fall of material and slip/trip hazard.

Six

The utility hose connected to the Utility Station between 1100-FV-323A and B was observed trailing along the walkway, posing trip and all hazards. **How does this project demonstrate application of your engineering knowledge?** Based On above findings, I obtained the following recommendations have been given by M/s RMT. • I replaced the 1100XEIV340 (30" x 150- Ball valve) trim with new one as seats and ball were badly scratched due to presence of solid particles. • I suggested a PST stroke which was increased up to 20% of valve stroke in lieu of actual 10% to avoid stuck condition of stem. • I avoided the regular maintenance/cleaning program for the formation of deposited of process material that can compromise the valve performance. • I suggested the PST frequency and performed every two or three months max in order to avoid stuck condition of stem.	
Work/Study Episode 2 **Overview of the project:** The project was carried out for Abu Dhabi Oil Refining Company and I conducted my duties as Senior Planning Engineer. The project purpose was providing coordination and support to the Planning and Scheduling Section Head to establish a preventive and programmed maintenance plan to meet the requirements of Ruwais Refinery by directing, coordinating and supervising the planning, preparation and scheduling of preventive, predictive, shutdown and major turnaround in-house maintenance activities in the department. **Your role and responsibilities:** I assisted in the preparation of a master plan for maintenance in compliance with the Refinery maintenance policy and P*rod*uction Plan. I ensured that all input to maintenance plans was accurate and consistent with the Refinery Master Plan. I identified requirements for the development of the computer based maintenance management system. Moreover, I participated in the development of in-house work scope in execution of major plant turnarounds. I prepared regular and ad hoc reports for management. I assisted with the coordination of Operations, Maintenance, Process Assurance and Quality, Workshop and other related departments for the timely execution of maintenance activities. I reviewed maintenance progress reports and statistics to plan and modify maintenance activities in coordination with Area Engineers. I conferred with the Section Head to develop and implement planning procedures to enhance planning operations to facilitate greater quality assurance. I utilized the Refinery Computerized Maintenance and Material Management system (MAXIMO), MS Project and Primavera for maintenance planning functions. I liaised with other disciplines to assist in the planning of the overhaul of Refinery plant and utility installations and equipment in compliance with the Refinery maintenance policy and production plans. I supervised detailed job preparation and scheduling activities and assists in obtaining external manpower/equipment services. I supervised the detailed planning and preparation work for modular plan shutdowns. I monitored shutdown progress and suggested methods to improve on the schedule. **Complexities (using the complexity definitions) and challenges of the project**	**Element** **Two** **Four** **Six**

I ensured plant history records for the Refinery and Utilities plant and equipment was maintained by the Area Engineers in CMMMS. I assisted in the preparation of the Section annual and five year budgets. I reviewed and followed up repairs associated with Work Request inspection lists and reports. I assumed the responsibilities of the Planning and Scheduling Section Head in his absence from the plant. I reviewed and followed up with respective disciplines for material requirement for Turnaround, especially long lead items. I exercised financial authority at the required level. Liaises with subcontractors to incorporate their plans into the overall maintenance plans.	**Three**
Monitoring of Planning Activities: I set up and maintained a maintenance backlog recording and monitoring system. I reviewed and followed up on the requirement and utilization of computer based maintenance management system. I liaised with Engineering Planning Support Section for CMMMS data correction and enhancement. I conducted maintenance planning for ensuring refinery product specifications which were met and optimum capacities were maintained.	**Four**
Reporting on Planning Activities: I prepared timely, accurate and regular maintenance planning related reports and KPI's, notes variances from the plans and advises the Section Head to implement corrective measures. Senior management was fully aw*are* of performance indices and issues concerning Ruwais Refinery Maintenance Planning activities.	**Six**
Health Safety Environment and Fire Procedures: I ensured that the subordinate staff complies with all Health, Safety, Environment and Fire Management System standards, procedures and requirements. I assumed the assigned role in the Incident Management Team and Crisis Management Team as per the Facility Response Staff in the Planning and Scheduling Section c*onform* to HSEF regulations and were well trained in safety practices and emergency procedures to eliminate incidents/accidents Plan.	**Four**
How does this project demonstrate application of your engineering knowledge? I devised work methods according to well defined policies, procedures and specialized professional standards. I obtained appropriate control with the planning engineering skills and reported to the Planning and Scheduling Section Head to resolve main issues relating to policies, budgets, etc. I completed work or projects which were subjected to general review by the Planning and Scheduling Section Head.	**Three**

Work/Study Episode 3

Element

Overview of the project: Gasoline & Condensate Turnaround (2014). Condensate (Train I&II) Turnaround was planned in October-November 2014 including Oil Movement area, after major Turnaround in 2010-2011. Maintenance has successfully managed to complete all In-House jobs, in addition to follow up of contractor activities and jobs received after the cut-off date. It is worth mentioning here that all the Turnaround activities of 76,230 Man-Hours were culminated without Lost Time Injury (LTI).

Four

The work order details are shown in the table underneath:

Sr. No.	Work order	LOCATION	JOB DE
21	WO3868708	ROPL	REPLACING OF STEAM TRAP ISOLATIC NO;A 8 ,13 /A8C
22	WO3868952	ROPL	REPLACING OF STEAM TRAP ISOLATIC NO;A 8, 18/A8B
23	WO3868955	ROPL	REPLACING OF STEAM TRAP ISOLATIC NO;A 8, 19 /A 8B

Three

I obtained the cost statistics which are as under:

Six

SECTION	TOTAL (Dhs.)
Mechanical	1,088,242.00
Instrument & Control	3,200,501.33
Electrical	623,087.69
TOTAL (A)	4,911,831.02

MANPOWER

CRAFT	Actual M Hrs	Rate Dh
ONCHART MANPOWER		
Mechanical Technician	15840	
Control Technician	5940	
Electrical Technician	3300	
Insulator	1100	
Turner	1650	
Painter	1100	
Welder	2200	
Fabricator	3850	
Bench Fitter	1650	
Crane Driver	2200	
Rigger	1584	
Heave Duty Driver	1100	
Helper	5940	

TOTAL COST

A	MATERIALS		
B	MANPOWER		
C	SPECIAL RESOURCES	SCAFFOLDING	
	MAJOR CONTRACT		

Seven

The description of the Project:

The planned MOC jobs in the project are:

Sr.No	MOC No.	DESCRIPTIO
1	290/13 EIR	Installation of New Kerosene pipeline 211 to Unit - 14.

Three

The additional MOC jobs are:

Sr.No	MOC No.	DESCRIPTIO
1	66/14	211-TC-145 controller alarm while sw manual to be provided
2	106/13	Unit-213 G003A/B shut down alarm c with audio sound to be provided.
3	18/14	Condensate Section graphic display

Four

Your role and responsibilities:

I carried out the KPI analysis which is underneath:

KPI ANALYSIS – GASOLI			
DESCRIPTION	TARGET	ACTUAL	
LOSS TIME INJURY	0	0	
COMPLIANCE TO SCHEDULE	≥ 100 %	100 %	
DISCOVERY JOBS (1)	≤ 15 %	57 %	

Two

I obtained the work order statistics which is as underneath:

S.NO.	WORK ORDER STATISTICS
1	WORK REQUESTS RECEIVED BEFORE CUTOFF DATE
2	WORK REQUESTS RECEIVED DURING

Three

The key actual completion dates for two phases were:

- Train I : 12/11/2014
- Train II: 30/11/2014

To focus on critical jobs individual task force teams were formed to follow up the contractor as well as In-house jobs execution in different areas. The integration of activities was planned in such a way to balance the available in-house resources and to fulfil all the requirements from Operations and Maintenance.

Six

The Clear Scope of work for area & workshop including all Vendors services, was made and planned well ahead resulted in successful execution.

Daily progress reports for in-house activities were being submitted / presented to the Management during daily shutdown meetings on a regular basis depicting the major events / activities elucidated in tabular and graphical formats.

Workbooks were prepared by Maintenance Planning and handed over to respective Sections Heads, Area Engineers and Supervisors for all the disciplines (Mechanical, Electrical and Control). These Workbooks were containing the following information:

- Organization Charts
- Unit Wise Maintenance Window
- Scope of Work & Procedures
- Manpower Details (Takreer + Hired)
- Detailed and Summarized bar Chart Schedules
- Daily & Cumulative Plan – 'S' Curve
- General Information
- Safety Guidelines
- Material Details

Four

How does this project demonstrate application of your engineering knowledge?

In order to make this Turnaround successful, massive efforts were made during the Planning Phase which was the key factor for completion of all Turnaround activities well in advance and in a very safe manner.

Two

Following were the major Planning Phases:

- Finalization of Organization Charts
- Preparation of Detailed and Summarized Bar Chart Schedule
- Preparation of Workbooks
- Follow-up, Coordination, Expediting and Integration of In-house jobs with Contract-out jobs
- Material Management (Identifications/Issuance/Arrangements/Verifications & Reconciliations)
- Daily Progress Review Meetings with all RRD Departments and Successive Maintenance

Sections Meetings The major activities covered under the Turnarounds were as under: • All Priority '5' jobs that raised by operations were executed successfully like; cut & weld repairs, flanged valves replacement, gland packing, valves servicing in W/Shop, Motor overhauling and alignment, Control valves, Analyzers servicing, level transmitters / gauges, vibration and level switches, heater flame scanners, loop checking, etc. • Carrying out gland packing replacement and gland tightening of critical isolation valves as per EIR recommendation No. 72/11. • Execution of Modification jobs (06 Nos.) • Unloading and Loading of Adsorbent in LPG Dryer (216-ME-001-D2 A/B) • Replacement of Clay in Clay Filter Vessels 214D008A/B and 414D008A/B • Painting of various process lines as per inspection recommendations • The IWL's issued by inspection section for various TAR jobs were planned and executed. Total 29 Nos. of IWL's were completed by In-house Maintenance during Condensate TAR 2014. All in-house jobs including various additional jobs (which were raised time to time during Turnaround) by Operations and Maintenance were executed for both Train I and Train II including Area-3.	**Six** **Four**

Work/Study Episode 4	**Element**
Overview of the project: Gasoline Turnaround was planned and executed out in October-November 2014 including Refinery Utilities. Due to meticulous planning, exhaustive preparations and tremendous efforts by Maintenance Teams, we managed to complete all the jobs within the agreed schedule. It is worth mentioning here that all the Turnaround activities of **61,380 Man-Hours were culminated with 0 Lost Time Injury (LTI)**.	**Three**
All the preparatory works and detailed planning was carried out under Maintenance Planning and different task force were formed to focus on certain critical jobs in different areas. The integration of activities was planned in such a way to balance the available in-house resources and to fulfil all the requirements from Operations and Maintenance. Daily progress reports for in-house activities were being submitted / presented to the Management during daily shutdown meetings on a regular basis depicting the major events / activities elucidated in tabular and graphical formats. Workbooks were prepared by Maintenance Planning and handed over to respective Sections Heads, Area Engineers and Supervisors for all the disciplines (Mechanical, Electrical and Control). These Workbooks were containing the following information:	**Four**
• Organization Charts • Unit Wise Maintenance Window • Scope of Work & Procedures • Manpower Details (Takreer + Hired) • Detailed and Summarized bar Chart Schedules • Daily & Cumulative Plan – 'S' Curve • General Information • Safety Guidelines • Material Details	**Six**
In order to make this Turnaround successful, massive efforts were made during the Planning Phase which was the key factor for completion of all Turnaround activities well in advance and in a very safe manner. Following were the major Planning Phases: • Finalization of Organization Charts • Preparation of Detailed and Summarized Bar Chart Schedule • Preparation of Workbooks • Follow-up, Coordination, Expediting and Integration of In-house jobs with Contract-out jobs • Material Management (Identifications/Issuance/Arrangements/Verifications & Reconciliations) • Daily Progress Review Meetings with all RRD Departments and Successive Maintenance Sections Meetings.	
Complexities (using the complexity definitions) and challenges of the project I implemented the planned MOC jobs in which I sorted the technical challenges using my Planning Engineering abilities.	**Four**

Sr.No	MOC No.	DESCRIPTION
1	WR 4107348	Additional guide support to avoid any slippage of resul support on Line # 6"-413-P558-11060Y-V at Unit - 413
2	33/11	Installation of flow transmitter on make-up gas stream upstream of Methanator (418-D-018)
3	39/11	Unit - 413 Pressure Transmitter installation

Two

The mechanical planned jobs are underneath:

Sr.No	Work order	LOCATION	JOB DE
ROTATING JOBS			
1	WO3871732	413K001	GSTA 2014 IHR// CARRY OUT SERVICI COMPRESSOR
2	WO3871738	413TK001	GSTA 2014 IHR// CARRY OUT SERVICI COMPRESSOR STEAM TURBINE
3	WO3871740	413K002A	GSTA 2014 IHR// CARRY OUT CRANK C COMPRESSOR
4	WO3872380	418ME101	GSTA 2014 IHR// CARRY OUT SERVICI

Three

The mechanical PMs were:

Sr.No	Work order	LOCATION	JOB DES
1	WO3905223	401G001B	CHARGE PUMP
2	WO3863744	402G003B	STRIPPER REFLUX PUMP
3	WO3835557	402G004A	PM: WASH WATER INJECTION PUMP
4	WO3835563	402G006A	PM: CORROSION INHIBITOR INJECTIOI
5	WO3905232	402G006B	CORROSION INHIBITOR INJECTION PU
6	WO3863755	404G004B	STRIPPER REFLUX PUMP (SPARE)
7	WO3895600	406G001A	AMINE GAS ACID CONDENSATE PUMF
8	WO3895602	406G001B	PM: Sulphur Transfer Pump
9	WO3863472	406G004B	INCINERATOR AIR FAN
10	WO3908275	406K002B	MIXED WASH WATER PUMP
11	WO3842521	407G001B	PM: CAUSTIC TRANSFER PUMP
12	WO3842525	407G002A	PM: CAUSTIC TRANSFER PUMP
13	WO3908277	407G003	NEUTRALIZATION FILLING PUMP
14	WO3842831	408G001B	PM: CHARGE PUMP
15	WO3842833	408G002A	PM: OFF SPEC PRODUCT PUMP

The controlled planned jobs were:

Sr.No	Work order	LOCATION	JOB DES
UNIT 401			
1	WO3872057	R401	GSTA 2014 CAI// CARRY OUT GASOLIN ACTIVTIES IN UNIT 401 AS PER T/A BAF • Temperature Transmitter 01 NO.S • Pressure Level Transmitter's 03 N • Level Switches 04 NO.S • Level Transmitter's 02 NO.S • Vibration Switches 04 NO.S
2	WO3933972	R401MISC	GSTA 2014 CAI// Replacing of the Dam
3	WO2273999	R401HXV100	GSTA 2014 CAI //checking of SIS12 syst
UNIT 402			
			GSTA 2014 CAI// CARRY OUT GASOLIN ACTIVTIES IN UNIT 402 AS PER T/A BAF • Temperature Transmitter 08 NO.S • Flame Scanner 03 NO.S • Level Transmitter's 14 NO.S

How does this project demonstrate application of your engineering knowledge?

The major activities covered under the Turnarounds were as under:

- Overhauling and servicing of following major rotating equipment:

413K001, 413TK001, 413K002A, 418ME101.

- All Priority '5' jobs that raised by operations were executed successfully like; cut & weld repairs, flanged valves replacement, valves servicing in W/Shop, Motor overhauling and alignment, Analyzers servicing, level transmitters / gauges, vibration and level switches, heater flame scanners, loop checking, etc.
- Execution of Modification jobs (15 Nos.)
- Replacement & Upgrading of DCS & ESD Project at Ruwais Refinery.
- Replacement & Upgrading of CRCS Emergency Shutdown Hardware & Software.
- Installation & Calibration of Gamma Ray Level Devices of Gasoline
- Flare Flow Transmitters calibration job follow up with Vendor.
- The IWL's issued by inspection section for various TAR jobs were planned and executed. Total 58 Nos. of IWL's were completed by In-house Maintenance during Gasoline TAR 2014.

All in-house jobs including various additional jobs (which were raised time to time during Turnaround) by Operations and Maintenance were executed.

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Knowledge Matrix

Knowledge Element	W/S Episode 1	W/S Episode 2	W/S Episode 3	W/S Episode 4
1. Application of knowledge from one or more of the natural sciences	1.8, 1.10	2.8, 2.10	3.8, 3.10	4.7, 4.9
2. Application of knowledge of mathematics	1.11, 1.12	2.6, 2.9	3.3, 3.7	4.8, 4.10
3. Application of knowledge of engineering fundamentals	1.7, 1.9	2.11, 2.12	3.4	4.6, 4.11
4. Application of specialist engineering knowledge to solve complex problems	1.12	2.7	3.6	4.12
5. Application of knowledge of design methods to solve complex problems	1.11, 1.13	2.13, 2.14	3.14	4.14
6. Application of knowledge of key elements of engineering practice	1.14	2.12	3.6, 3.7	4.6, 4.8
7. Role of Engineering in Society	1.8, 1.10	2.8, 2.13	3.8, 3.9	4.9, 4.10

8. Application of advanced knowledge in an area of your discipline	1.7, 1.9	2.14	3.12, 3.13	4.12

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SECTION FOUR – SUPPLEMENTARY EVIDENCE

Academic Transcript(s)

Please attach a certified copy of your academic transcript(s) if you have not already supplied one to IPENZ

WORK HISTORY SUMMARY

List your employment history starting from your most recent employment and then chronologically back to the start of your first job.

Ref No	Name of Employing Organisation	Position Title	End mm/yy Start mm/yy	Key responsibilities, activities undertaken, major achievements and/or projects. These should relate to your practice area description.
1.	ADNOC Refining (TAKREER) – Abu Dhabi Oil Refining Co. (ADNOC)	**Senior Planning & Performance Engineer**	Present Start at 07/2016	• Assuming the responsibilities of Planning Section Leader in his absence from the plant. • Contributing comprehensive project management expertise in the areas of – Project Planning, scheduling, drawing cost estimates and judiciously deploying manpower, machines and material resources to optimize overall efficiency. • Assessing competency for all planners, schedulers and trainees as department assessor. • Maintaining coordination with the project team & all internal/external parties to freeze the technical parameters/ work scope to iron out any ambiguities • Managing resources to create estimates for the project, work breakdown structure, project plan, contingency plan & schedules and identifying risks within time and cost constraints. • Identifying , developing and implementing initiative related to operational excellence • Leading and motivating workforce and monitoring their efforts to achieve highest individual and team productivity. • Initiating continuous improvement concept to enhance working practices, procedures and machine performance. • Implementing preventive, planned & predictive maintenance and driving

Ref No	Name of Employing Organisation	Position Title	End mm/yy Start mm/yy	Key responsibilities, activities undertaken, major achievements and/or projects. These should relate to your practice area description.
				continuous improvement • Managing safety issues while supervising the site to ensure that all the safety parameters are complied with to assure safety of the employees • Execute cost saving techniques/ measures and modify the system as & when necessary to achieve substantial reduction in O&M expenditure • Assisting in the budgeting activity of the plant and managing all financial activities. • Coordinating and following up on maintenance contracts and contractual obligations assigned to planning along with respective concern engineers; recommending payment against respective budget & cost codes with cost control engineer.
2.	ADNOC Refining (TAKREER) – Abu Dhabi Oil Refining Co. (ADNOC).	**Planning Engineer**	End date: 06/2016 Start date:12/2013	• Managed project development from beginning to end. Defined project scope, goals & deliverables that support business goals in collaboration with senior management and stakeholders. • Planned the execution of maintenance activity, observed standard procedures for maintenance & considerably reduced down time. • Ensured plant safety and observed physical conditions of work & work practices and implemented preventive, planned and predictive maintenance to maximize uptime of equipment& installations. • Maintained proper documentation / records of control and review of maintenance, repairs, additions, changes and modifications also ensured all repair and maintenance work was carried out in a safe and professional manner and that machinery and equipment were available for use at all times. • Creating job specifications and job scope for development of contracts and assisting in the evaluation of bids received. • Coordinating and following up on maintenance contracts and contractual obligations assigned to planning along with respective concern engineers; recommending payment against respective budget & cost codes with cost control engineer. • Ensuring periodic and preventive maintenance is appropriately scheduled & accomplished and emergency troubleshooting & maintenance support are readily available.

Ref No	Name of Employing Organisation	Position Title	End mm/yy Start mm/yy	Key responsibilities, activities undertaken, major achievements and/or projects. These should relate to your practice area description.
				• Developing various computerized reports on work order back log, manpower and material utilization and maintenance performance indices.
3.	ADNOC Refining (TAKREER) – Abu Dhabi Oil Refining Co. (ADNOC).	**Maintenance Engineer**	End date: 09/2013 Start date:04/2014	• Performed planning function for work orders related to daily work priorities, estimation of plant maintenance (rotary & static) equipment. • Spearheaded activities pertaining to shutdown, estimation of manpower & material required for major turnaround & assisted Planning Engineer for reservation of material and preparation of shutdown schedules on primavera software. • Provided technical inputs like work/job step details, estimated resources like manpower, equipment, cost and duration in preparation of technical work scopes and to assist in preparation of contract document. • Analysed data from Maximo, guide field engineers & supervisors to acquire the target set by senior management for maintaining KPI's like manpower, work requests, backlog, preventive maintenance and maintenance cost. • Pivotal Participation in major Turnaround and warranty shutdowns such as: Condensate Plant Turnaround 2006, Gasoline Plant Warranty shutdown 2007, Condensate Plant turnaround 2010, Gasoline Turnaround 2010, Green Diesel plant warranty shutdown 2013.
4.	Lahoud Engineering Co. Dubai, UAE	**Mechanical Engineer**	End date: 11/2005 Start date:01/2004	• Supervised all construction activities and provided technical inputs for methodologies of construction & coordination with site management activities. • Formulated & reviewed method statements and quality control plans. • Spearheaded transportation, installation and commissioning of various static and rotating equipment. • Administered fabrication and erection of process and utility piping. • Engaged in activities pertaining to under-ground piping fabrication, protective coating/wrapping and insulation works. • Ensured strict adherence to necessary safety measures like necessary

Ref No	Name of Employing Organisation	Position Title	End mm/yy Start mm/yy	Key responsibilities, activities undertaken, major achievements and/or projects. These should relate to your practice area description.
				preparation of work-site, fire-fighting equipment, personal protective & gas detection equipment, scaffolding and staging, safe load indicators for heavy erection equipment, usage of only certified machinery, tools & tackles.

CONTINUED PROFESSIONAL DEVELOPMENT (CPD) ACTIVITIES SUMMARY

DESCRIPTION OF ACTIVITY AND LEARNING. **Please record all relevant CPD activities (eg. short course, conference, reading, technical lectures, formal study towards qualification, research, discussion groups, workshops, symposia, voluntary service roles) that have extended your professional engineering knowledge and have assisted you to develop the knowledge profile of a professional engineer. Describe the learning outcomes and how these have contributed to your acquiring a Washington Accord level of knowledge.**					**Was Formal Assessment involved?** **What was the outcome?**
Date(s)	**Actual Hours**	**Form of Activity**	**Title of activity**	**What was the knowledge you acquired?** **How have you applied this knowledge in your engineering practice?**	
June 2018	40	Training	Maximo – CMSS Training	Completed training on Maximo – CMSS software and learnt the advance skills related to it.	Course Completion Certificate
December 2017	40	Training	Primavera Software Training	The design techniques were implemented with the Primavera software utilization of completing the management related tasks.	Course Completion Certificate
June 2017	40	Training	MS Project Software Training	Attended workshop related to MS Project Software.	Course Completion Certificate

DESCRIPTION OF ACTIVITY AND LEARNING. **Please record all relevant CPD activities (eg. short course, conference, reading, technical lectures, formal study towards qualification, research, discussion groups, workshops, symposia, voluntary service roles) that have extended your professional engineering knowledge and have assisted you to develop the knowledge profile of a professional engineer. Describe the learning outcomes and how these have contributed to your acquiring a Washington Accord level of knowledge.**					**Was Formal Assessment involved?** **What was the outcome?**
Date(s)	**Actual Hours**	**Form of Activity**	**Title of activity**	**What was the knowledge you acquired?** **How have you applied this knowledge in your engineering practice?**	
January 2017	40	Training	CFM Certified Facility Management	Attended training related to CFM Certified Facility Management.	Course Completion Certificate

SECTION FIVE - PAYMENT

KNOWLEDGE ASSESSMENT (LEVEL 2) FEE PAYMENT

ASSESSMENT FEE (INCL GST) IN NZD | **NZ$1,351.25** | Please send a receipt ☐

CREDIT CARD DETAILS:

Visa ☐ Bankcard / Mastercard ☐ American Express ☐ Diners Card ☐

Credit Card Number | | | | | | | | | | | | | | | |

Name on card **Expiry Date** **CVV**

Cardholders Signature _____

WHERE TO SEND COMPLETED DOCUMENTS

Send the completed form and associated documents to the **IPENZ Membership Manager** at one of the addresses below:

Engineering New Zealand
Level Six
40 Taranaki Street
Wellington 6011
New Zealand

Postal Address:

Engineering New Zealand
PO Box 12-241
Wellington 6144
New Zealand

Appendix One

COMPLEXITY DEFINITIONS

COMPLEX ENGINEERING PROBLEMS

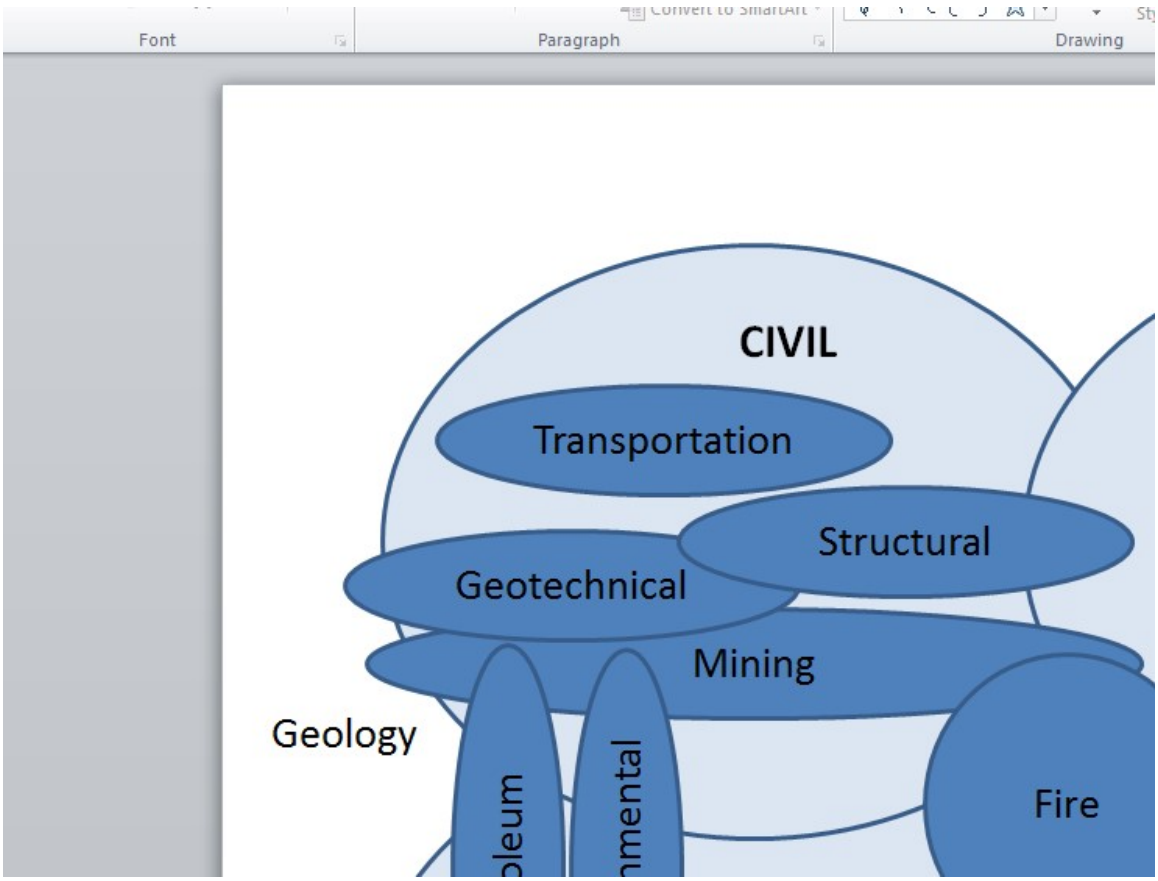
Complex engineering problems have some or all of the following characteristics:

- Involve wide-ranging or conflicting technical, engineering, and other issues;
- Have no obvious solution and require originality in analysis;
- Involve infrequently encountered issues;
- Are outside problems encompassed by standards and codes of practice for professional engineering;
- Involve diverse groups of stakeholders with widely varying needs;
- Have significant consequences in a range of contexts;
- Cannot be resolved without in-depth engineering knowledge

APPENDIX TWO

DISCIPLINES AND FIELDS OF ENGINEERING

Engineering practice fields are loosely defined terms and are used as an indication of the nature of engineering work carried out by engineers practising in an engineering field of practice. The following diagram is a graphical display of the relationships between the various fields and the four core disciplines. Some fields may extend into other fields of scientific endeavour.



AEROSPACE ENGINEERING

Aerospace engineering is the design, development, and production of aircraft (aeronautical engineering), spacecraft (astronautical engineering) and related systems. Aerospace engineers may specialise in aerodynamics, avionics, structures, control systems or propulsion systems. It may involve planning maintenance programmes, designing repairs and modifications and exercising strict safety and quality controls to ensure airworthy operations.

BIO ENGINEERING

Bioengineering draws heavily on the Chemical Engineering discipline and involves the engineered development of raw materials to produce higher value products, using biological systems (biological catalysts). The description also encompasses the general application of engineering to biological systems to develop new products or solve problems in existing production processes. As examples, bioengineers are found in medical research, genetic science, fermentation industries and industries treating biological wastes.

BUILDING SERVICES

Building Services engineering is the application of mechanical or electrical engineering principles, and an understanding of building structure, to enhance all aspects of the built environment from air conditioning and mechanical ventilation, electrical light and power, fire services, fire safety engineering, water and waste services, data and communications, security and access control, vertical transportation, acoustics and energy management.

CHEMICAL ENGINEERING

Chemical engineering is concerned with the ways in which raw materials are changed into useful and commercial end products such as food, petrol, plastics, paints, paper, ceramics, minerals and metals. Often these processes are carried out at large scale plants. Research of raw materials and their properties, design and development of equipment and the evaluation of operating processes are all part of chemical engineering.

CIVIL ENGINEERING

Civil engineering is a broad field of engineering concerned with the, design, construction, operation and maintenance of structures (buildings, bridges, dams, ports) and infrastructure assets (road, rail, water, sewerage). The Civil engineering discipline underpins several engineering fields such as Structural, Mining, Geotechnical and Transportation engineering, in which civil engineers often specialise. General Civil engineers are likely to be competent to undertake work that relates to one or more of these areas.

ELECTRICAL ENGINEERING

Electrical engineering is the field of engineering which deals with the practical application of electricity. It deals with the aspects of planning, design, operation and maintenance of electricity generation and distribution, and use of electricity as a source of energy within major buildings, industrial processing complexes, facilities and transport systems. It includes the associated networks and the equipment involved such as switchboards, cabling, overhead lines/catenaries, earthing, control and instrumentation systems.

Areas of specialisation within the wider electrical engineering discipline, such as electronics and telecommunications are usually concerned with using electricity to transmit information rather than energy. For this reason electronics and radiocommunications/telecommunications are captured under the field of Information Engineering.

ENGINEERING MANAGEMENT

The Engineering Management practice field is used by engineers who manage multi-disciplinary engineering activities that are so multi-disciplined that it is difficult to readily link their engineering practice with any other specific practice field. Project managers, asset managers and engineers working in policy development are likely to use the 'Engineering Management' field.

ENVIRONMENTAL ENGINEERING

Environmental engineering draws on the Civil and Chemical engineering disciplines to provide healthy water, air and land to enhance human habitation. Environmental engineers devise, implement and manage solutions to protect and restore the environment, within an overall framework of sustainable development. The role of the environmental engineer embraces all of the air, water and soil environments, and the interactions between them.

FIRE ENGINEERING

Fire engineering draws on knowledge from the range of engineering disciplines to minimise the risk from fire to health and safety and damage to property through careful design and construction. It requires an understanding of the behaviour of fires and smoke, the behaviour of people exposed to fires and the performance of burning materials and structures, as well as the impact of fire protection systems including detection, alarm and extinguishing systems.

GEOTECHNICAL ENGINEERING

Geotechnical engineering involves application of knowledge of earth materials in the design of structures, such as foundations, retaining walls, tunnels, dams and embankments. Geotechnical engineers assess the properties and performance of earth materials such as their stability and strength, and the impact of groundwater.

INDUSTRIAL ENGINEERING

Industrial engineering is the application of mechanical and electrical engineering principles to the design and operation of production equipment, production lines and production processes for the efficient production of industrial goods. Industrial engineers understand plant and procedural design, the management of materials and energy, and human factors associated with worker integration with systems. Industrial engineers increasingly draw on specialised knowledge of robotics, mechatronics, and artificial intelligence.

INFORMATION ENGINEERING

The field of Information engineering is based on the Electrical engineering discipline but also draws heavily from Computer Science. Three areas of further specialisation can be identified:

Software engineering - The development and operation of software-intensive systems that capture, store and process data.

Telecommunications engineering - The development and operation of systems that encode, transmit and decode data via cable systems (including fibre optics) and wireless systems (radiocommunications).

Electronics engineering - The design, development and testing of electronic circuits and networks that use the electrical and electromagnetic properties of electronic components integrated circuits and microprocessors to sense, measure and control processes and systems.

MECHANICAL ENGINEERING

Mechanical Engineering involves the design, manufacture and maintenance of mechanical systems. Mechanical engineers work across a range of industries and are involved with the design and manufacture of a range of machines or mechanical systems, typically applying principles of hydraulics (fluid control), pneumatics (air pressure control) or thermodynamics (heat energy transfer). Mechanical engineers may specialise in the Building Services or Industrial engineering field.

MINING ENGINEERING

Mining engineering involves extracting and processing minerals from the earth. This may involve investigations, design, construction and operation of mining, extraction and processing facilities.

PETROLEUM ENGINEERING

Petroleum engineering is a field of engineering relating to oil and gas exploration and production. Petroleum engineers typically combine knowledge of geology and earth sciences with specialised Chemical engineering skills, but may also draw on Mechanical engineering expertise to design extraction and production methods and equipment. Petroleum engineering activities are divided into two broad categories:

Upstream - locating oil and gas beneath the earth's surface and then developing methods to bring them out of the ground.

Downstream - the design and development of plant and infrastructure for the refinement and distribution of the mixture of oil, gas and water components that are extracted

STRUCTURAL ENGINEERING

Structural Engineering is a specialised field within the broader Civil engineering discipline that is concerned with the design and construction of structures. Structures might include buildings, bridges, in-ground structures, footings, frameworks and space frames, including those for motor vehicles, space vehicles, ships, aeroplanes and cranes, composed of any structural material including composites and novel materials.

TRANSPORTATION

Transportation engineering is a specialised field of practice in the civil engineering discipline relating to the movement of goods and people by road, water, rail and air.

A Transportation engineer might specialise in one or more of: pavement design, asset maintenance/management, construction/project management, traffic operations and control, transportation planning and systems analysis, freight transportation and logistics, road safety, railways or public transport systems.