WHAT YOU WILL GAIN:

• Skills and competencies in E & I oil and gas engineering
• Knowledge of the latest technologies in E & I oil and gas engineering
• Key techniques in operating your facility to the highest level of safety and in protecting the environment
• Tremendous boost to your E & I oil and gas career – no matter whether you are a new engineering graduate or a technician
• Decades of real experience distilled into the course presentations and materials
• Guidance from real E & I oil and gas experts in the field
• Hands-on practical knowledge from instructors with extensive real-world experience
• Credibility as the local expert in E & I oil and gas
• Networking contacts in the oil and gas industry
• Improved career prospects and income
• An EIT Advanced Diploma of E & I Engineering for Oil and Gas Facilities

COMMENCEMENT DATE:
For upcoming commencement dates, please view our course schedule at:
http://www.eit.edu.au/schedule

Visit our website: www.eit.edu.au

** A note regarding recognition of this course in the Australian education system: The EIT is the owner of this course. The course is officially accredited within the Australian Qualifications Framework by the Training Accreditation Council, and is approved by the Australian Skills Quality Authority (ASQA) for delivery by the EIT in all Australian states. The EIT delivers this course to students worldwide.
Introduction

There is a growing shortage, and hence opportunity, for Electrical and Instrumentation [E & I] technicians, technologists and engineers in the oil and gas industry. This is due to an increasing need for higher technology methods of obtaining and processing oil and gas as it is a finite declining resource. The price of oil is heading upwards steadily, thus making personnel and their associated oil and gas expertise in these industries even more valuable. The technical challenges of extracting oil and gas are becoming ever more demanding, with increasing emphasis on more marginal fields and previously inaccessible zones such as deep oceans, Polar regions, Falkland Islands and Greenland. The aim of this 18-month e-learning program is to provide you with core E & I engineering skills so that these opportunities may be accessed, to enhance your career, and to benefit your firm.

Often universities and colleges do a brilliant job of teaching the theoretical topics, but fail to actively engage in the application of the theory of E & I engineering, especially the necessary practically based subjects for the oil and gas industries. Much of the material key to E & I practice and its professional application in the workplace is not covered in sufficient detail in university and college curriculums. This advanced diploma is presented by instructors who are highly experienced engineers from industry, having ‘worked in the trenches’ in the various E & I engineering areas. When doing any course today, a mix of both extensive experience and teaching prowess is essential. All our instructors have been carefully selected and are seasoned professionals.

This advanced diploma course provides a practical treatment of electrical power systems and instrumentation within the oil, gas, petrochemical and offshore industries. Whilst there is some theory this is used in a practical context giving you the necessary tools to ensure that the Electrical and Instrumentation hardware is delivering the results intended. No matter whether you are a new electrical, instrumentation or control technician/technologist/graduate engineer or indeed, even a practising engineer, you will find this course beneficial in improving your understanding, skills and knowledge of the whole spectrum of activities ranging from basic E & I engineering to advanced practice including hazardous areas, data communications along with a vast array of E & I equipment utilised in an oil and gas environment.

EIT Accreditation Status

The Engineering Institute of Technology [EIT] is an institute for higher learning. It has emerged from its founding organisation, IDC Technologies, which is an international provider of practical, technical training. Since its conception in 1991, three hundred thousand engineers, technicians and technologists have been trained globally. The EIT has received recognition, endorsement and/or accreditation [varies by course and location] from authorising bodies based around the world.

These include:

- IEEE - The IEEE, based in the USA is the world’s leading professional association for the advancement of technology, with more than 375,000 members in more than 160 countries. The EIT is an IEEE Continuing Education Provider.
- The Training Accreditation Council in Australia - The national leader in the strategic management of the recognition and quality assurance of training.
- The Institute of Measurement and Control in the United Kingdom - Britain’s foremost professional body for the Automation Industry. The Advanced Diploma is recognised by the Institute of Measurement and Control as contributing to the 'initial professional development' required for eventual registration as Chartered or incorporated Engineers. The Advanced Diploma is also approved by the Institute as providing CPD.
- South Africa - The Engineering Council of South Africa (ECSA) which aims to promote a high level of education and training of practitioners in the engineering profession, has validated a large number of courses. The EIT has obtained validation for CPD Points from the SAIMechE (South African Mechanical Institute), COTET (Chamber of Engineering Technology) and SAIEE (South African Institute of Electrical Engineers), who are Voluntary Associations recognised by ECSA (Engineering Council of South Africa). To view our list of validated courses and programs, visit ECSA's website www.ecsa.co.za and refer to the CPD Activities. South African students who complete an EIT advanced diploma successfully can apply for recognition by SAQA, who have determined that the course is at Level 6 in the National Qualifications Framework (equivalent to National First Degree or Higher Diploma: www.sqa.org.za/show.asp?Include=focus/id.htm) in South Africa's educational system. However, in most cases formal individual recognition by SAQA is not required as the international validity and accreditation of this credential is very sound.
- EIC - EIT is a Participating Partner with the Engineering Institute of Canada (EIC) and EIT programs and courses can be utilised by members to register for Continuing Education Units (CEUs). The EIC's Continuing Education Program is supported by The Canadian Council of Professional Engineers, The Association of Consulting Engineers of Canada, and The Canadian Academy for Engineering. The EIC is a member of the International Association for Continuing Education and Training, with headquarters in Washington, DC.
- Asia Pacific Utilities Group Supplier Management System - EIT has achieved full registration on the Asia Pacific Utilities Group Supplier Management System (APUG SMS).
- AQF - The Australian Qualifications Framework (AQF) is the national policy for regulated qualifications in Australian education and training. The Advanced Diploma of Electrical and Instrumentation (E & I) Engineering for Oil and Gas Facilities is an AQF accredited qualification.

For additional information please see http://www.eit.edu.au/international-standing.
COURSE STRUCTURE

The valuable oil and gas course has five main streams:

1. Electrical engineering
2. Instrumentation and control engineering (onshore and offshore)
3. General oil and gas engineering
4. Subsea instrumentation and control
5. Floating Production, Storage and Offloading (FPSO) Facilities

Oil and Gas Electrical Engineering – Design, Installation, Commissioning and Maintenance

Electrical power systems within the oil, gas, petrochemical and offshore industries have significantly different characteristics to a typical power utility and associated consumers of electricity. This course provides an excellent balance between basic applicable mathematical theory and practical know-how which is so essential in applying this immediately to your work. Solid, practical knowledge is provided in the electrical systems equipment used in off-shore production platforms, on-shore separation and production plants, drilling rigs, pipelines, refineries and even general petrochemical plants. Because of the hazardous nature of oil and gas plants there is particular emphasis on the design, installation, commissioning, maintenance and use of electrical equipment in hazardous areas. You will gain confidence in basic design, selection, and operation of the typical electrical equipment used in these areas. Numerous practical rule-of-thumb examples are given to enable you to make quick estimates and assessments whilst engaged in your work.

Oil and Gas Instrumentation and Control Engineering – Design, Installation, Commissioning and Maintenance

Instrumentation and control engineering is the most diversified and challenging area in the oil and gas industry. It covers a whole gambit of engineering such as:

- Instrumentation Engineering - You will learn about design documentation and specification, field measurement devices, control elements, condition and machine monitoring, field bus, actuators, control valves, severe service valves, solenoids, hydraulics, testing and calibration, wireless instrumentation, instrument fittings/monoflanges/manifolds/tubing and accessories, "on-line" process analysers and sample systems, pressure relief valves, choke valves and associated "real world" applications.
- Control System Engineering – This extremely interesting area covers Programmable Logic Controllers (PLCs), Supervisory Control and Data Acquisition (SCADA), Distributed Control Systems (DCS), control system tuning, basics of advanced process control, control applications, compressor surge control, pneumatic controllers, programmable automation controllers, process control security, OPC and smart plant concepts.
- Safety Instrumented Systems – SIS is a very important part of any oil and gas plant in that these systems provide the most important safety layer necessary to protect a facility. You will learn about Safety Integrity Levels [SIL], the importance of maintaining SIS instrumentation, safety logic, Burner Management Systems (BMS), emergency shutdown systems and their certification, shutdown and blowdown valves, SIS standards, fire and gas detection and protection systems and devices along with combined safety systems.

In addition you will get some insight into High Integrity Pipeline Protection Systems (HIPPS).

General Oil and Gas Engineering

This covers critical aspects which are applicable across all disciplines associated with oil and gas engineering including:

- Corrosion – as many oil and gas installations are either on the coast or in offshore locations a basic understanding of corrosion and how to mitigate against its effects is very important. By just installing a fitting of the wrong material, the safety of a multimillion dollar facility can be compromised.
- Health, Safety and Environment, including facility safety cases, legislation, spill reporting, hazards, work permits, safe working practices, working with high pressure hydraulics and Job Safety Analysis (JSA) documentation.
- How to write a resume and CV, techniques for selling yourself at an interview.
- Basics of oil and gas process plant, the importance of understanding how a plant works with real examples of an offshore oil and gas platform, refinery and LNG plant.

Presentation Format

The programme features real-world applications and uses a multi-pronged approach involving interactive on-line webinars, simulation software and self-study assignments with a mentor on call.

The course consists of 72 topics delivered over a period of 18 months. Presentations and group discussions will be conducted using a live, interactive software system. For each topic you will have an initial reading assignment [which will be delivered to you in electronic format in advance of the online presentations]. There will be coursework or problems to be submitted and in some cases there will be practical exercises, using simulation software and remote labs that you can easily do from your home or office.

You will have ongoing support from the instructors via phone, fax and e-mail.

Live Webinars

During the programme you will participate in 72 live interactive sessions/webinars with the instructors and other participants from around the world. Each webinar will be scheduled at two varying session times, so that you can select the one which is most convenient to you. Webinar times are only finalised after registrations close, as we need to know which time-zones all participants are based in before we can compile a schedule. Upon registration you will receive a questionnaire regarding your time availability. We guarantee that at least one session time, for each webinar, will fall into your preferred time slot.

Prior Learning Recognition and Exemptions

The EIT can give you full or partial credit for modules where you can demonstrate substantial prior experience or educational background. An assessment fee may apply. If you wish to find out more please ask us for your copy of the policy for recognition of prior learning.

Time Commitment for the Course

You will need to spend an estimated 6-10 hours per week. This includes the reading of the material prior to your attendance at each hour webinar [45 minutes with 15 minutes for discussion] and the time needed to complete assignments for submission. This time would be required to ensure the material is covered adequately and sufficient knowledge is gained to provide sound, enduring and immediately useful skills in engineering. The EIT operates almost all year long, so your studies will continue most weeks of the year to enable you to achieve the qualification in an accelerated time period when compared to a traditional semester-based system.
WHERE TO FROM HERE?

Articulation to higher level programs at the Engineering Institute of Technology (EIT)

Successful students of the Advanced Diploma of E & I Engineering may be able to move into post-graduate studies with the EIT. This advanced program articulates into the Vocational Graduate Diploma of Project Management in Industrial Automation and (for successful students) into the Master Degree in Business and Project Management (provided by the Asia Pacific International College). Even though there would appear to be some overlap no credit can be given for any topics covered in the Advanced Diploma as the level of materials in the Vocational Graduate Diploma of Project Management in Industrial Automation is at a considerably higher level (above that of a Bachelor degree).

Each individual application is considered on its merits and admission is subject to the applicant meeting specified criteria. It is crucial that the candidate for the Vocational Graduate Diploma is highly competent with all the materials associated with the lower level advanced diploma course before attempting the post-graduate level of knowledge. The criteria for entering a Graduate Diploma normally include a bachelor of engineering with sufficient experience and demonstrated knowledge. Students who have achieved outstanding results at advanced diploma level and can demonstrate a high level of experience may be considered.

The EIT is also working on a Vocational Graduate Diploma in Electrical Engineering and a Vocational Graduate Diploma in Mechanical Engineering, which will articulate into the Master Degree with APIC as detailed above. The Advanced Diploma may also articulate into these Vocational Graduate Diploma programs once they are ready for delivery.
Practical Exercises, Remote Labs and Assignments

You will participate in practical exercises using a combination of remote laboratories and simulation software, ensuring you get the requisite hands-on experience. This will give you a solid practical exposure to the key principles covered in the course and ensure you are able to put theory into practice.

As research shows, no matter how gifted and experienced an instructor [and we believe ours are some of the best worldwide], no one learns from an instructor only presenting course materials to them in a lecture format. It is only by the additional activities of hands-on exercises using simulation software, remote laboratories, practically based assignments and interactive discussion groups with both your peers and the instructor that you are able to internalise this knowledge, “take ownership of it” and apply it successfully to the real world. You should note that there is some degree of overlap between the practical sessions between the different units to reinforce the concepts and to look at the issues from different perspectives.

Traditional distance learning thus presents challenges in achieving these goals but we believe today with the modern e-learning technologies available combined with outstanding instructors that we can give you an equivalent or indeed even better experience than on a traditional university campus.

Practical sessions may be added, deleted or modified by the instructors to ensure the best outcome for students.

Benefits of Live E-learning

- Attend lessons in a live, virtual classroom with your instructors and fellow students
- Upgrade your skills and refresh your knowledge without having to take valuable time away from work
- Receive information and materials in small, easy to digest sections
- Learn from almost anywhere - all you need is an internet connection
- Have constant support from your course instructors and coordinator for the duration of the course
- Interact and network with participants from around the globe and gain valuable insight into international practice
- Learn from international industry experts
- Live interactive webinars, not just a ‘book on the web’
- Receive an accredited EIT Advanced Diploma of Electrical and Instrumentation (E & I) Engineering for Oil and Gas Facilities

Who Should Attend

This course would be ideal for you if you are seeking to gain know-how and expertise in the oil and gas business and are an:
- Instrument and process control technician or technologist
- Instrument fitter
- Chemical or mechanical engineer
- Electrical engineer currently working in a different area to oil and gas
- Experienced electrician
- A recent graduate electrical, instrumentation or mechanical engineer

Even if you are highly experienced you will find this a great way to become familiar with the oil and gas technology as quickly as possible.

For more information or to enrol, please contact us at enquiries@eit.edu.au

About the Engineering Institute of Technology (EIT)

The key objective of the Engineering Institute of Technology (EIT) is to provide outstanding practical engineering and technology education; from Diplomas and beyond. The finest engineering lecturers and instructors, with extensive real world engineering experience in industry, are drawn from around the world. The learning is gained through web and video based, online (e-learning) technologies.

The EIT offers awards in a growing array of engineering fields. Many (perhaps, most) engineering faculties at universities and colleges experience a significant challenge delivering the course-work affordably and with excellence. The EIT achieves this using online based education - economical class sizes are attainable, international experts are engaged to instruct and remote laboratories and simulation software are employed.

The EIT is a sister company of the well known and reputable engineering training organisation, IDC. IDC Technologies. IDC has been operating for over 20 years, from offices throughout the world, delivering practical short courses to well over 300,000 engineers and technicians.

Why EIT?

- Our lecturers are selected and recruited from amongst the top engineers/instructors in their field - worldwide. These presenters are highly skilled at presenting challenging concepts and ideas to students of varying levels and abilities.
- As shown in the detailed course prospectus, the courses are aimed at practising professionals giving hard-hitting practical know-how relevant to today’s market and is aimed at people working in industry. We design and select Case Studies and practical exercises in the course based upon real-world business requirements. Feedback from the tens of thousands of students we have trained over many years has allowed EIT a unique understanding of real world business requirements and we have tailored the course accordingly.
- We have experience in training over 300,000 engineers and technicians throughout the world and have built up a library of outstanding reference materials which focus on what engineers and technicians need in their work today in industry and mining. The value of these references is considerable and they are a great asset to industry professionals. These reference materials are included in the cost of the course.
- The course content is challenging and designed for engineers and technicians already working in industry. We assume a general understanding of the demands of the workplace. A student without practical experience would be unsuited to the course.
Entrance Requirements

This Engineering Institute of Technology advanced diploma is an accelerated, practical, work-oriented course. It is designed for engineers and technicians who have some background in the field. This includes those who have technical or 'trade' qualifications who want to move to the next career step, those with substantial relevant work experience who need to formalise and enhance their achievements, and those with higher level qualifications in a related field who wish to develop specialist knowledge. Practical work experience in related areas of engineering would help enormously. It would not be suitable for a student with no relevant work experience. We will review your enrolment application and may recommend pre-course studies if required.

Advanced Diploma Preparation Course

If you are unsure if you have a strong enough grasp of the fundamental knowledge required for this course, or you simply want to refresh your skills and experience e-learning in a shorter course, we recommend that you consider the EIT’s engineering studies preparation course. This intensive 4-month course covers the fundamentals of engineering maths, physics and chemistry. Please ask your advisor for the brochure. If you don’t currently have an existing qualification and/or experience, please contact us for advice. Most important, however, is a determination to persist and complete this course.

On completion of this course, 50% of the course fees can be used as a credit towards your fee for an EIT Advanced Diploma course.

Hardware and Software Requirements

All you need in order to join the webinars once registered for the course is an adequate internet connection, PC, speakers and a microphone. The software package and setup details will be sent to you prior to the course.

We are Flexible With Your Commitments

We recognise that personal circumstances can make it difficult to complete the course in the time available. We will be flexible about the time you require to complete the course. You can “pause and restart” by joining a subsequent intake (a rejoining fee may apply). We will allow up to 3 years from your original commencement date to complete the course.

You can withdraw from the course at any time and receive a statement of attainment for the topics you have completed. However, completion of all 72 topics will earn you the EIT Advanced Diploma of Electrical and Instrumentation (E & I) Engineering for Oil and Gas Facilities.

Comprehensive e-Books and Associated Documentation

You will receive 30 of our up-to-date technical e-Books to add to your library. Together these texts contain over 8000 pages of valuable know-how distilled from years of experience in presenting these courses throughout the world.

Participants only completing selected topics will receive only the relevant documentation.

1) Electrical Drawings and Schematics
2) Practical Power Transformers: Operation, Maintenance and Testing
3) Practical Power Distribution
4) Grounding/Earthing, Shielding and Surge Protection of Electrical Equipment for Instrumentation and Control
5) Practical Power System Harmonics, Grounding/Earthing and Power Quality - Problems and Solutions
6) Practical Instrumentation for Automation and Process Control
7) Practical Control Valve Sizing, Selection and Maintenance
8) Practical Programmable Logic Controllers (PLCs) for Automation and Process Control
9) Practical SCADA Systems for Industry
10) Practical Troubleshooting and Problem Solving of Industrial Data Communications
11) Practical Safety Instrumentation and Emergency Shutdown Systems for Process Industries
12) Practical Hazardous Areas for Engineers and Technicians
13) Best Practice in Process, Electrical and Instrumentation Drawings and Documentation
14) Practical Power System Protection for Engineers and Technicians
15) Practical Process Control
16) Practical Troubleshooting and Problem Solving of Modbus Protocols
17) Practical Fundamentals of Telecommunications and Wireless Communications
18) Safe Operation & Maintenance of Circuit Breakers and Switchgear
19) Practical Energy Efficiency, Design, Engineering and Auditing
20) Lightning, Surge Protection and Earthing of Electrical & Electronic Systems in Industrial Networks
21) Electrical Maintenance for Engineers and Technicians
22) Practical Shielding, EMC/EMI, Noise Reduction, Earthing and Circuit Board Layout
23) Practical Analytical Instrumentation in On-Line Applications
24) Practical Alarm Management for Engineers and Technicians
25) Practical Industrial Flow Measurement for Engineers and Technicians
26) Practical Intrinsic Safety for Engineers and Technicians
27) Fundamentals of Process Plant Layout and Piping Design
28) Practical Mechanical Seals - Selection, Maintenance and Troubleshooting
29) Practical Machinery Vibration Analysis and Predictive Maintenance
30) Leading Your Engineering Team to Top Performance

Please Note: Students who choose to pay upfront will receive all 30 e-Books in advance. If you opt to pay by instalments you will receive e-Books periodically throughout the course. e-Books are available in hard copy at 50% of the recommended retail price. Contact us for pricing details.
What Our Students Have to Say

QUOTES FROM PAST STUDENTS on the EIT 2009 SURVEY ON E-LEARNING to the following question:
What made you choose an EIT course(s)?

“Good reputation, had attended good full-time courses previously.” Worley Parsons

“Course facilitator CV, ...reputation, e-learning flexibility.” SMK, New Zealand

“Content tends to practical and targeted.” MIPAC, Australia

“Non-vendor specific training and lower course costs with online training capabilities.” Worley Parsons

“The content of the course and the way the course was broken down were the key factors.” GEA Group

“I can do those courses at my own free time which made it more convenient for me” Iluka, Australia

“Content was applicable to my job and industry. Taught by industry experts not academics. E-room delivery mode. Accreditation in various nations.” Sanofi Pasteur, Australia

“Because it is specialist, and so many available courses.” Kacst, Saudi Arabia

“Covered all my criteria and gave me recognised qualifications on completion.” Netafim

“I took a previous course, IDC [associated organisation] is professional.” Cat Group

“I have done other courses with IDC [associated organisation] and was happy with the service provided.” GHD

“Had completed courses previously. Good content.” Woodside

“I understood from friends that it is good quality.” Rio Tinto

“Better choice of topic.” Rockwell RA

“Believed to be good quality based on previous training courses I have done in person.” BHP Billiton, South Africa

“It was referred to me by a colleague and I have attended seminars run by IDC before. The course that I am currently enrolled in also had all the outcomes I was looking for to further my career.” Rio Tinto

“The course content was relevant to my work environment and practical.” Alcoa

“I have done a few IDC courses in the past and found them to be very good and delivered by people with practical knowledge of the subjects.” Kalgold

“It provides good online course delivery including its quality support structures” OneSteel

“Course interest and content.” ABB, Australia

“The fact the I could do it online and it was in line with furthering my knowledge for work.” CAED, Australia

“It ticked all the boxes ... quality, suitability, depth, length.” Powerco, New Zealand

“Better choice of topic.” Rockwell RA

“Course was visible and relevant.” Schneider Electric, UK

“Convenience.” Rio Tinto

“To be perfectly honest with the small amount of research on various courses I did the courses are generally the most relevant to my area of work. That’s not to say they are perfect but they seem to be superior to others readily available in this part of the world.” WEL Networks, New Zealand

“Course content seems practical and applicable. I already have a BSc where the focus is on the theory.” BHP Billiton, South Africa

“Industry recognition and recommendation by colleagues.” Rio Tinto

“Seemed the most convenient option, and it was!” CPIT, New Zealand

“Course content ease of study option.” Nestle, South Africa

“The content of the course made up my mind.” Transportadora de gas del Norte, Argentina

“The fact courses are standard and course material as well as lecture are okay.” Shell, UK

“Its international recognition with body endorsing certification. Easy to attend lessons after work hours. Easy way of course payment.” Kinyara Sugar Ltd, Uganda

“The most practical and technical offerings by the most qualified instructors for distance learning.” Encana Natural Gas

“On line references, price, and various time frames available to sit in on the class. Also, one more important item was being able to converse with the instructor and class instead of working totally on my own.” Mitchell Technical Institute

“Course content Accreditation of the training institution. Cost.” MODEC

“Offer the correct course, timing and affordable cost.” Folec, Brunei

“Possibly the most recognised online institution within my industry.” DRA, South Africa
Frequently Asked Questions

What are the advantages of studying online?
We know that many potential students have part or full-time employment as well as family commitments, so finding the time to study a classroom-based course is not always possible. Many students also have geographical, travel and time limitations and do not have an accessible institution or training provider. We have taken this into consideration and developed an affordable, flexible, online approach to training. This means that you can study from anywhere, with minimum downtime from work – but still have the necessary interactive learning experience. The software we use does not require very fast internet connection or a sophisticated computer. A basic connection and hardware are sufficient.

What are the fees?
The EIT provides distance education to students located almost anywhere in the world – it is one of the very few truly global training institutes. Course fees are paid in a currency that is determined by the student’s location. A full list of fees in a currency appropriate for every country would be too complex list here and, with today’s exchange rate fluctuations, difficult to maintain.
To find out the fees for your location, contact us at enquiries@eit.edu.au.

What do I need?
An adequate Internet connection, speakers and a microphone. A headset is recommended. The necessary software and course materials are provided by us.

Doesn’t it get boring? How can an e-Learning course be interactive?
Boredom can be a real risk in any form of learning; however, we use an interactive approach to our e-Learning – with live sessions (instead of recordings) for most presentations. The webinar software allows everyone to interact and involves participants in group work; including hands-on exercises with simulation software and remote laboratories where possible. You can communicate with text messages, or live VoIP speech, or can even draw on the whiteboard during the sessions. This all helps to keep you motivated and interested.

What do live webinars involve?
These are live, interactive sessions over the Internet. You will join the instructor and other participants from around the world in an online ‘virtual classroom’ where you are able to watch a presentation, and communicate with the instructor and other students via audio, text messaging or drawing on the whiteboard. Each webinar is between 60 and 90 minutes in duration and the sessions are scheduled at 2 or 3 different times during the presentation day. This allows you to select the session which is most convenient.

What if I cannot join or I miss a live webinar?
Webinars are recorded and available to students upon request. One requirement of the course is that you join at least 70% of the live sessions. The live webinars offer the opportunity to interact with the presenter and other participants from around the globe - an essential yet enjoyable part of the learning process.
Circumstances such as on-site work can make attendance difficult at times. These situations need to be clearly communicated with your e-learning coordinator. Feedback from the recordings may be required and assignment submission maintained.

When will the sessions take place? When will I receive a webinar schedule?
The webinar schedule is not put together until after registrations close. The reason for this is that the course is promoted globally and we often have participants from several time zones. When you enrol you will receive a questionnaire which will help us determine your availability. When all questionnaires are returned we create a schedule which will endeavour to meet everyone’s requirements.
Each webinar runs 2 or 3 times during each presentation day and we try our best to ensure that at least one session falls into your requested time frames. This is not always possible, however, due to the range of locations of both presenters and students. If you are unable to attend the webinars scheduled, we do have some options available. Contact the EIT for more details.

Can I complete the course in less time?
Our courses actually require ‘attendance’ and participation at the live webinars. The interaction which takes place is an important part of the learning process. Our experience has shown that the interactive classes work exceptionally well and students are far more likely to stay motivated, enjoy the program, and complete the course successfully. See also ‘What if I cannot join or I miss a live webinar?’ In addition, accelerating the course would be quite onerous for most students.

How much time do I need? How long is the course?
The course reading and assignments may consume anywhere from 5 to 10 hours per week. This will vary depending on the course subject matter and your existing knowledge.
The EIT does not use a traditional semester-based system, which means that you can complete the qualification faster without long breaks. Each advanced diploma course is delivered over an intensive 18 months. We do break for about 4 weeks per year for traditional festive seasons.

Contact us! For any other enquiries, please contact us at enquiries@eit.edu.au
International Expert Speaker Faculty

Your team of professional presenters and facilitators are drawn from experts in their field. They will work closely with you for the duration of the course.

Course Designer and Consultant

Jim Russell  IEng (UK) FIICA MinstMC

Jim has been working in the Instrument and Control engineering discipline for over 40 years, mainly in the oil and gas industry. After studying in the UK, he started his career as an Instrument Apprentice with Esso Fawley, rapidly followed up as an Assistant Instrument Engineer with British Gas, which he regarded as his ‘real apprenticeship’.

On moving to Australia, he then progressed to Instrument Engineer with Worley Engineering on the Woodside Energy North Rankin “A” platform, before becoming the Instrument focal point at WAPET. Following this his role was Lead Control Systems Engineer on the Woodside Energy Goodwyn A platform design with responsibility for the Process Control and Safety Systems, where he pioneered the successful introduction of new technologies such as industrial data communications underpinning the traditional instrumentation and Distributed control Systems. After successful completion of this project Jim joined rapidly growing Australian multinational, Woodside Energy, as Principal Instrument Engineer with responsibilities for standards, technical integrity, new technology and instrument systems. Jim now consults in a wide range of mainly oil and gas topics.

As a public service to engineering professionals, Jim has set up what must surely be one of most comprehensive (free or pro bono) resources on Instrumentation, Control, Fire and Gas and Safety System called iceweb (http://www.iceweb.com.au). He has also acted as chair of the Foundation fieldbus End User Council Australia, and was one of only five engineers worldwide who are members of the Foundation fieldbus End User Advisory Council. When not consulting and reading, Jim enjoys time with his family and at his beloved beachside cottage “down south”.

Course Designer and Electrical Engineering Instructor

Dr Alan Sheldrake  PhD BSc(Elec.Eng)

Alan has a keen interest in most aspects of power system design and operation, and specialises in large rotating machines and high voltage equipment. Until 1985 he was based mainly in London working for the Central Electricity Generating Board (CEGB) and several major petrochemical engineering contractors, such as Stone & Webster Engineering, Worley Engineering, Brown & Root and AMEC. Since then, Alan has done the bulk of his work at various locations in Europe, the Middle East and Asia. Over the past decade he has tended to specialise in the following subjects:

• Performance of traditional control systems for gas turbines and generators.
• Application of Power Management Systems (PMS) for gas turbines and generators to improve operability, availability and to minimise unnecessary shut down of whole power plants.
• Computer simulation of power systems and their individual components, e.g. DOL and soft starting of large induction motors, gas turbine PID governor control systems, AVR’s and exciters, D-Q axis transient modeling of generators.
• Coordination and computer simulation of protective relaying, e.g. special cases such as coordinating under-frequency relays with load shedding elements of a PMS.
• Programming and simulation of complex calculations for repetitive situations, e.g. volt-drop in cables and lines, cable sizing, harmonic penetration, transient performance of generators and motors.

This experience stimulated him to write his world famous comprehensive handbook: Handbook of electrical engineering for practitioners in the oil, gas and petrochemical industries. Although Alan has a strong practical bias to his career, he has also had a vibrant academic career with numerous papers published and a Ph.D from Imperial College, London. His main hobbies are mathematics, constructing electronic devices and playing golf.

Course Designer and Instrumentation Instructor

Dr Steve Mackay  PhD, CP Eng, FIE (Aust) BSc[ElecEng], BSc[Hons], MBA, MMR
Dean of Engineering, EIT

Steve has worked in engineering throughout Australia, Europe, Africa and North America for the past 30 years. He has presented numerous industrial automation and industrial data communications courses worldwide to over 18,000 engineers and technicians, and has a particular interest in practical and leading edge aspects of marketing, business and engineering practice.

He is a fellow of Engineers Australia and the technical director and founder of IDC Technologies, a growing engineering training and publishing firm which has been operating from offices throughout the world since 1992. He has also acted as the author or editor of over 30 engineering textbooks sold throughout the world. He feels that all engineering businesses need to think globally and keep experimenting with new approaches. Currently, he is actively involved in research and implementation of remote lab technology.
Ian Verhappen  BSc, P. Eng, ISA Fellow, ISA Certified Automation Professional

Ian has been involved in digital communications since 1994 installing the first multi- vendor Foundation Fieldbus project in 1996. Since then, Ian has served as both a leading Project Engineer/Designer and an external/cold eyes review consultant for a number of companies and in pulp and paper, mining, food processing, water and wastewater, oil sands processing, petrochemical and refining industries.

Ian is co-author, with Augusto Pereira, of ISA’s popular “Foundation Fieldbus Pocket Guide”. Also under Ian’s guidance as editor, is the Foundation Fieldbus End User Advisory Council’s “Engineering Design Guide, Foundation Fieldbus document AG-181”. This is the definitive guide for the complete life cycle for Fieldbus projects. The “Guide” has been translated into German, Japanese, Chinese and Russian, demonstrating how widely it is used as the basis for many corporate and project specifications. Ian is also an active volunteer with ISA, serving as Vice-President of the Standards and Practices 2005/6 and was the person responsible for the formation of the ISA-100 Industrial Wireless committee on which he continues to participate. Ian is also heading up the Fieldbus Foundation’s High Speed Ethernet Remote I/O development team.

Ian is known as a digital communications evangelist and his passion for the topic has taken him around the world to share his experiences. Ian has the ability to explain technology in simple terms that can be understood by others without the same level of theory or experience, a rare quality! Ian’s seminars are less presentation than they are interactive conversations loaded with practical examples and experiences, his enthusiasm for the topic is contagious and leaves you not only more knowledgeable about the topic but excited to go “make it work”.

Terry Cousins  PrEng, BSc (Elec Eng)

Terry Cousins was educated at La Salle College in Discovery, and obtained a BSc Electrical Engineering degree from Wits in 1977. He has over 30 years of experience in electrical power and distribution systems in various South African industries including the mining and steel sectors, with national companies such as ISCOR and Chamber of Mines Research.

He is currently a director of TLC Engineering Solutions which develops a wide range of instrumentation and measurement systems for industry. He also presents numerous courses on electrical power distribution and power quality, both in South Africa and abroad.

Terry is a Senior Member of the SAIEE, and a Member of the IEEE (USA) and has also has served on the South African National Standards committee for power quality instruments [SANS 1816]. Terry is an accredited professional with the Green Building Council of Australia, and has BComm and MBL degrees from UNISA.

With his extensive experience electrical engineering, you will walk away with valuable know-how that you can apply immediately to your work.


Andre has over 30 years experience in Electrical and Mechanical engineering in the mining industry, mainly underground and surface operations for gold, coal and platinum mines. Andre worked on various in-house projects and problem solving, in plants and smelting furnaces, including materials handling, battery locos and overhead trolley lines.

He has also had experience in maintaining and upgrading sub-stations, power distribution to concentrator plants, furnace, and mine sites. Some of his more notable projects were the installation of new 6.6kV cables down vertical winding shafts on gold mines and upgrading the OCBs to VCBs and doubling the capacity of Transformers for two 42MW furnaces for Anglo American mines in South Africa. Andre is a knowledgeable presenter with hands-on experience in a range of industries, which he is eager to share.
International Expert Speaker Faculty

Course Presenter

Jerry Walker  D.Tech

Jerry is one of those rare engineers who has worked all the way up from “the tools” as an electrical Millwright to achieving a doctorate in High Voltage and Diagnostic Engineering of Electrical Cable Insulation. He commenced his career working on the Hot Strip Mill in a steel plant, on maintenance of protection systems and Variable Speed Drives, for 10 years. He then spent 9 years in the oil and gas industry where he was involved in the commissioning and maintenance of the complete spectrum of Power Electronic and Power Engineering equipment.

He has devoted the next fourteen years to a combination of research/consulting and lecturing, focusing on Power Distribution, Power Systems Protection and High Voltage Engineering. One of his major successes during that period has been the designing, equipping and commissioning of a complete high voltage laboratory for the engineering school of a prominent university where he is a professor in the Institute for High Voltage Studies. He is also a director of a consulting company focusing on high voltage testing and the supply of test equipment. He has presented hundreds of courses in electrical engineering topics throughout the world, including Africa, USA, Europe, Australia and Malaysia.

Course Presenter - Senior Hazardous Areas Instructor

Geoff Bottrill  HNC, DMs, MIEE

Geoff has been working in the instrumentation, measurement and control fields for over twenty-five years and has spent the past fifteen years specialising in Hazardous Areas, Intrinsic Safety and Instrumentation Drawings. Geoff began his career at Kent Instruments, as a service engineer working in both the UK and East Africa. His experience ranges from systems design functions, on-site trouble shooting to technical and commercial customer support.

Recently Geoff has taken on the responsibility of mentoring engineers in training, in addition to the presentation of engineering workshops in the process control and measurement field. His positive interactive style to teaching has made him popular with workshop attendees worldwide.

Course Presenter

Derwyn Oxley  MAP, Dip. MD, HNC

Derwyn studied as an Instrument Technician in UK with British Nuclear Fuels Ltd and qualified with City & Guilds in Industrial Measurement & Control [1976 – 1981]. He has worked all over South Africa since 1982 and has been involved with a wide variety of processes and manufacturing industries. His first involvement with PLC’s started in 1983 and SCADA 1985.

Derwyn has served on SAPICS [SA APICS representatives] Cape Town Committee since 1999 and SA Institute for Measurement & Control from 1994 to 2007 where he was chairman from 1996. He has also lectured at Cape Peninsula University of Technology, delivered papers at various conferences and societies throughout South Africa and is a regular contributor to the industry. He currently runs a highly successful systems integration business whose main activity is writing PLC and SCADA software. Through Oxley Inc, Derwyn has trained and mentored many student engineers and really contributed to SA’s need for empowerment and upliftment in a meaningful way. He is a positive and enthusiastic instructor and enjoys passing his skills and know-how.

Course Presenter - Senior Instrumentation Engineer

Dr Rodney Jacobs  NH Dip, M Dip Tech, BA [Hons], D Tech

Rodney has over 20 years experience in the gold mining industry, underground as well as specialising in Metallurgical operations in the Gold Plants. He has worked predominately in the instrumentation; process control and automation field, and is responsible for hardware and software designs associated with instrumentation. His areas of special interest include PLCs, SCADA systems, process control and programming. Having spent many years on the shop-floor, Rodney has built up a vast amount of hands-on practical experience, and is a past recipient of the N & Z award, which is one of the most prestigious awards, for South Africans in the field of instrumentation.

Rodney is currently active as a Consulting Engineer in the field of instrumentation, both to the mining industry as well as to other general engineering companies, which require specialised solutions. He has also lectured in Electronics, Electrical Engineering and Digital Systems, at a university level. Rodney feels that people are the most important asset of any organisation and has a qualification in Psychology to complement his Engineering knowledge and experience.

Rodney has presented numerous IDC workshops in the United States, England, Ireland, Scotland, Bahrain, United Arab Emirates, Iran, Vietnam, Australia, New Zealand, Malaysia and a great deal of sub-Saharan countries in Africa.
International Expert Speaker Faculty

Course Presenter

Trevor Blackburn  PhD, MIIET, MIEEE CEng

Trevor has over thirty years experience in researching, teaching and consulting in the field of power system equipment, including circuit breakers, transformers and power cables. His main areas of expertise are in the insulation and operational aspects of these items of equipment and in the condition monitoring of high voltage equipment. He has had extensive involvement in CIGRE activities on both the local and international scenes and was the Australian representative on Study Committee 15/D1 (Materials, diagnostics and emerging technology). He is a member of a number of international working groups of CIGRE in the above areas. Although still actively involved in research, he is a consultant to the electrical supply industry and has published numerous papers.

In addition to his research activities he has organised and lectured in many seminars and courses for the electrical supply industry in the specific areas of electrical safety, partial discharges, condition monitoring, electrical instrumentation, building services and power system equipment. He has extensive experience in lecturing to industry and is an excellent and knowledgeable presenter with a strong grasp of the practical issues challenging the engineer and technician today. He has presented short courses extensively in Australia and South East Asia.

Course Presenter

John Lawrence  BSc (Hons) MSc B.Com (Hons)

In today's hyped up world, one is hesitant to describe anyone as 'outstanding', but John Lawrence has distinguished himself over the last 20 years with excellent course reviews.

John has 20 years of experience as a project and departmental manager for a multinational oil company, focusing on designing and managing the infrastructure of the telecommunications, data communications and IT systems. In the past 5 years, John has worked extensively for a number of multi-national clients, managing projects including facilities management, budgeting and financial forecasting.

When John is not consulting or lecturing, he enjoys increasing his own skills by reading and writing about state-of-the-art technology topics and how to optimise Return On Investment (ROI) for the overall IT infrastructure. John is a dedicated professional who has trained engineers and technicians throughout the world.

Course Presenter - Senior Chemical Engineer

Mr John Westover  BSc ChEng, M Eng Sci Process Integration

John has over 28 years of experience in the oil and gas industry, and his career has taken him from Rocky Mountains and the Arctic Coast of Alaska to various locations in Australia, with several stops in between. He has previously worked for both owner/operators such as Amoco and BP and the engineering company, Fluor and has first hand understanding of the unique needs and requirements of various stakeholders.

He first earned the respect of his operations and maintenance co-workers when he proved some thermocouples were not working properly – he had to wear a safety harness and climb a 35-tray distillation column outside the ladder cage to get some data (the data verified his theory).

John completed his Masters degree, specifically looking at how process integration could be systematically used to reduce the weight of offshore platforms [which resulted in a paper for the Society of Petroleum Engineer]. Since then his career has started to transition into training and mentoring roles. He developed a practical course for Monash University, showing how the principles of Chemical Engineering taught in school could be applied to real engineering problems and has consistently been one of the most highly rated courses by the students. He has also developed remote training modules for operations and maintenance personnel for a facility expansion with new technology in Pakistan.

Course Presenter

G. Vijayaraghavan  B.E. (Hons) Electrical

G. Vijayaraghavan is an electrical engineer with over 35 years experience in the Steel Industry and Engineering Consultancy.

He is the author of several of IDC's technical books including Practical Earthing, Bonding, Shielding and Surge Protection which has been published and sold internationally by Elsevier(UK).

He regularly designs training workshops for IDC and lectures on their behalf to engineers and technicians world-wide.

He is a very knowledgeable instructor and his courses are extremely interesting with many ideas, anecdotes and tips drawn from his rich experience.
International Expert Speaker Faculty

Course Presenter

Dr. Peter Fuhr

Dr. Peter Fuhr has been involved in industrial wireless, sensors, and secure systems for 30 plus years as a NASA Space Optical Physicist, University Professor, and Serial Entrepreneur. Dr. Fuhr, who has dual roles as CEO of Wi-Fi Sensors and Senior Member of Research & Development at Oak Ridge National Laboratory, serves as the Co-Chair of The Secure Infrastructure Controls Society, is the Director of the Association for Advanced Agricultural Technology, and is the co-founder and past Chairman of the Wireless Industrial Networking Alliance.

Peter is involved in wireless, sensors, and control systems standards organizations chairing numerous work groups and committees. He has embedded sensors into various structures worldwide ranging from buildings, dams, airplanes, hot air balloon, spacecraft, nuclear power plant containment vessels, even humans. Peter has published/presented over 700 technical articles pertaining to wireless, sensors, security and systems.

His pioneering work in networked sensor systems for structures earned him the Presidential Award for Excellence in Research. Segments of his research activities are featured in the SPIE Milestone Series on Fiber Optics.

Course Presenter

David Wilson Ph.D. CE

David Wilson obtained his Ph.D. in Chemical Engineering at the University of Queensland, Australia in 1990. Since then he has worked at ETH in Zürich, and as a senior lecturer in the Department of Electrical Engineering at Karlstad University, Sweden.

Currently he is an Associate Professor in the Department of Electrical and Electronic Engineering at Auckland University of Technology, a corporate member of the Institute of Chemical Engineers [UK], and an Associate editor for the Journal of Process Control.

His main research interests are modelling, simulation and control of industrial processes particularly focused on the pulp and paper, oil and gas, and the electricity industries.

Course Presenter

Deon Reynders BSc Eng (Hons)(Elec), MBA

Deon has had over 25 years experience in automation, data communications [with a focus on industrial applications] and Ethernet TCP/IP networks. He has specific experience in Systems Engineering, Project Management and software and hardware development, and has been involved with efficiency studies [related to underground operations] in the gold mining industry in South Africa.

Currently he is retained as a consultant to industry in the TCP/IP, industrial Ethernet networking, O PC and the industrial data communications areas. Deon is a practical, hands-on person and a highly entertaining speaker. He has received excellent reviews from his thousands of course participants in regions ranging from Europe, North America, Africa and Australia. He takes great pride in demystifying difficult concepts and presents them in a simple-to-understand manner. He is a passionate, enthusiastic and knowledgeable professional engineer.

For more information
or to enrol, please contact eit@eit.edu.au
Module 1: Fundamentals of Electrical Engineering

You will learn how to:

- Review of fundamental electrical concepts
- Describe electrical distribution systems as applied to oil and gas

Overview

This will give a quick overview of the key areas of electrical engineering. You will review the fundamentals of electricity, alternating current systems, electrical generation, transmission and distribution and the key equipment of electrical systems and also examine the distribution concepts followed in oil and gas industry.

THE PROGRAM

Topic 1.1
OVERVIEW OF POWER SYSTEMS AND GENERATION OF ELECTRIC POWER

- Historical overview
- Electricity production and use
- AC and DC
- Single and 3 phase AC systems
- Relation between frequency and poles in a generator
- Electrical power and energy
- Active and reactive power
- Power triangle
- 3 phase circuit relationships
- Electrical networks
- Generation-non renewable and renewable sources
- Transmission and distribution

Module 2: Fundamentals of Instrumentation, Measurement and Process Control Engineering

You will learn how to:

- Explain key concepts of industrial automation systems
- Describe key concepts of Instrumentation and measurement
- Configure simple PLC systems

Overview

This module performs an introductory overview of the key areas of the fast growing area of industrial automation (including instrumentation and control systems) as applied to the oil and gas industry. The topics covered include an introduction to instrumentation and measurement ranging from pressure, level, temperature and flow devices; followed by a review of process control. PLC systems are discussed.

THE PROGRAM

Topic 2.1
PROCESS MEASUREMENT: BASICS AND COMMON TYPES

INTRODUCTION TO PROCESS MEASUREMENT
- Basic measurement concepts
- Definition of terminology

PRESSURE MEASUREMENT
- Principle of pressure measurement
- Pressure sources
- Pressure transducers and elements

LEVEL MEASUREMENT
- Principles of level measurement
- Simple sight glasses
- Buoyancy tape systems
- Hydrostatic pressure
- Ultrasonic measurement
- Radiation measurement
- Electrical measurement

TEMPERATURE MEASUREMENT
- Principles
- Thermocouples
- Resistance Temperature Detectors (RTD’s)
- Thermistors
 Module 3: Electrical Drawings, Documentation and Schematics

You will learn how to:

- Apply know-how in the various types of electrical drawings and their applications
- Show expertise in planning electrical drawings, selecting a proper [paper] size for each type of drawing and the most appropriate scale to be used
- Apply industry-standard symbols/representation approach

Overview

It is often said that drawing is engineers’ language. Drawings are used to communicate and share information between different teams of engineers; the design engineer who conceptualises an equipment or system, the production engineer who plans the steps in manufacturing the required components and subsystems, the Assembly engineer who puts the components together, the testing engineer who tests the complete system, the installation engineer who installs the system or equipment and the maintenance engineer who is responsible for its upkeep. To all these engineers with diverse backgrounds and expertise, a drawing should convey precise and identical information. This calls for standardised methodologies, conventions and approach in preparing drawings. This module will cover all these aspects with respect to engineering drawings in general and electrical drawings in particular. Various types of electrical drawings and their application, the steps in planning a drawing, selection of drawing size and scale, use of standardised symbols etc. will be described in detail with commonly used examples from industry practice.

Computer Aided Drafting (CAD) has brought about a major change in the way drawings are prepared and has caused a phenomenal improvement in drawing office productivity. No organisation can afford to use the older manual methods of preparing drawings today. Apart from reuse and easy modification of existing drawings to create new ones, complete or partial automated drawing preparation has also become a possibility. The module discusses the advances made in this field and the links between drawings and manufacturing using 3D visualisation tools and computer aided manufacturing (CAM) approach.

Use of CAD-CAM tools presents its own challenges in the way drawings are stored, shared between different groups of users and revised for reuse. The module also covers these aspects and takes a look at future possibilities in the way drawings will be used to disseminate information.

THE PROGRAM

Topic 3.1
INTRODUCTION TO DRAWINGS, USE OF SYMBOLS AND SCHEMATIC DIAGRAMS

- Relevance of drawings in engineering
- Drawings at the center of all activities
- Types of drawings and application
- Standards in drawings
- 2 and 3 dimensional representation
- Computer aided drafting; an introduction
- Components of an engineering drawing
- Scales and sheet sizes
- Electrotechnology symbols
- Single line and 3 line diagrams for electrical circuits
- Control schematics
- Logic gates and logic diagrams

Topic 3.2
DIFFERENT TYPES OF LAYOUTS, 2D/3D DRAWING REPRESENTATIONS AND DRAWING MANAGEMENT

- Cabling and wiring drawings
- Layout drawings for different applications
- P&I diagrams and their importance in process control
- CAD drawings for 2D and 3D applications
- Features of CAD and benefits
- Parametric programming
- Drawing management
- Revision control and drawing ownership
- Drawing process flow
- Redlining in CAD drawings

Practical Exercises

- Reading and interpretation of single line diagrams
- Reading and interpretation of schematic drawings
- Reading and interpretation of logic diagrams
- Reading and interpretation of cabling drawings
- Reading and interpretation of layout drawings
  [Inclusion of facilities immediately surrounding the subject being laid out]
You will learn how to:

- Explain practical power distribution fundamentals
- Explain the intricacies involved in planning power distribution for an industrial facility
- Determine short-circuit ratings quickly and effectively
- Assess the influence of fault levels on switchgear ratings
- Selecting the correct type of in-house generation for critical loads and connection to plant systems

Overview

A practical module in power distribution, focusing on medium voltage (1kV-36kV) power considerations, switchgear, and network studies. You will gain technical know how in these areas not covered by university or college programs.

THE PROGRAM

**Topic 4.1**
**DISTRIBUTION SYSTEMS-OVERVIEW AND ALTERNATIVES**

- Typical characteristics of an industrial distribution system
- Main components of an industrial distribution system
- Distribution system equipment
- Electrical safety and power security
- Voltage classification
- Voltage levels in a distribution system
- Types of distribution
- Typical distribution configuration
- O&G distribution - special requirements and practices

**Topic 4.2**
**DISTRIBUTION SYSTEM PLANNING AND SIZING OF EQUIPMENT**

- System planning approach
- Data needed for planning
- Collection of data
- Studies needed
- Distribution equipment sizing
- Load assessment
- Factors considered
- Equipment requirements and selection of rating
- Device coordination (type 1 and 2)
- Cable sizing

**Topic 4.3**
**SHORT CIRCUIT CALCULATION AND ITS APPLICATION**

- What is a fault?
- Effects of a fault
- Types of faults
- Limiting the damaging effects of a fault
- What is impedance?
- Impedance in “per unit value” and its method of calculation.
- Representing the electrical network as an equivalent diagram
- Reduction of impedance diagram for calculation of fault currents
- Concept of base MVA for equivalent circuits
- Effect of motors on faulted circuits
- Use of fault current calculation

**Topic 4.4**
**POWER SUPPLY FOR CRITICAL LOADS**

- Why in-plant generation?
- Emergency power, standby power
- Consideration in planning
- Preferred generation methods in industrial installations
- Integrating emergency sources with plant distribution
- Parallel operation of generator with external supply
- Points to note in parallel operation
- Typical O&G practices and applications in onshore and offshore facilities
Module 5: Power Transformers

You will learn how to:

- Explain fundamental theory and principles of the operation of power transformers
- Identify and apply transformers’ types
- Explain power transformers components and their construction
- Apply power transformer protection
- Perform power transformers oil and oil tests and interpretation of results
- Perform the most effective power transformer electrical tests

Overview

Installation of high voltage distribution and transmission equipment has increased significantly over the years due to ongoing global demand for power. As a result, the need to ensure the reliability of operation of power systems is paramount. Power transformers are among the most important and most expensive components of power systems, their failure can impose extraordinarily high costs on plants, factories and utilities of all descriptions. It is critical that all personnel operating and working with such equipment have a sound knowledge of their operational requirements and maintenance.

This practical module provides knowledge on both the theory and operation of power transformers. The module will develop and enhance an understanding of what is involved in the maintenance of these essential components of the power systems, through the tips and tricks learnt and developed by some of the world’s pre-eminent electrical engineers.

THE PROGRAM

Topic 5.1
TRANSFORMER THEORY, TYPES, CONSTRUCTION AND CHARACTERISTICS

- Transformer principle
- EMF equation of a transformer
- Vector diagram of transformers
- Equivalent circuit
- Impedance and voltage regulation
- Polarity, vector group and connections
- Shell type and core type
- Construction aspects and main components
- Insulation and cooling
- Dry type transformers and applications
- Surge protection, Buchholz relay, pressure relief relay
- Thermal devices and instruments (oil temperature alarm and trip, winding temperature alarm and trip)
- Ratings and specifications

Topic 5.2
INSTALLATION, MAINTENANCE AND TESTING

- Electrical schemes and plant layouts
- Transformer layouts
- Indoor locations
- Outdoor installation
- Core-and-coil assembly
- Noise considerations
- Power circuit connections
- Changes in design parameters
- Site installation practices
- Pre-commissioning checks
- Transformer operation and maintenance
- Transformer inspection intervals
- Moisture in transformers
- Removal of core and assembly
- Transformer oil analysis
  - Water, acidity, dissolved gas
  - Dielectric breakdown, moisture, resistivity, interfacial tension, specific gravity, power factor, furan analysis.
  - Recovery voltage measurement test

- Testing of transformers
  - General
  - Routine tests
  - Type tests
  - Special tests
  - Transformer standards
  - Tests on parts
  - Transformer oil tests
  - On site acceptance tests
- Recommended transformer field tests and checks
- Transformer principle
Module 6: Switchgear for Power Distribution

You will learn how to:

- Explain practical power distribution fundamentals
- Determine short-circuit ratings quickly and effectively
- Assess the influence of fault levels on switchgear ratings
- Selecting the correct type of switchgear for the right application

Overview

A practical module in power distribution, focusing on medium voltage (1kV-36kV) and low voltage switchgear. You will gain technical know how in these areas not covered by university or college programs.

Module 7: Cables and Wires – Maintenance and Installation Practice

You will learn how to:

- Perform testing and preventative maintenance on power cables
- Select and install cables
- Extend life of cables
- Describe how to splice/joint and terminate cables

Overview

Faults in underground cable may cause loss of supply to customers and loss of revenue for suppliers so it is imperative that the fault location process is efficient and accurate to minimise excavation time, which results in reducing inconvenience to all concerned. For fault locating to be efficient and accurate technical staff need to have expert knowledge accompanied with experience in order to attain service reliability.

This module is designed to ensure that those responsible for the selection, laying, operation, maintenance and monitoring of power cables understands the technical issues involved and comply with relevant specifications and requirements.
**Overview**

This module has been designed to give plant operators, electricians, field technicians and engineers a better appreciation of the role played by power protection systems. An understanding of power systems along with correct management will increase your plant efficiency and performance as well as increasing safety for all concerned. The module is designed to provide excellent understanding on both a theoretical and practical level. Starting at a basic level and then moving onto more detailed applications, it features an introduction covering the need for protection, fault types and their effects, simple calculations of short circuit currents and system earthing. This module includes some practical work, simple fault calculations, relay settings and the checking of a current transformer magnetisation curve.

**THE PROGRAM**

**Topic 8.1 FUNDAMENTALS**

**NEED FOR PROTECTION**
- Selectivity, stability, sensitivity, speed
- Reliability, dependability, security

**FAULT TYPES AND THEIR EFFECTS**
- Active, incipient, passive, transient, asymmetrical, etc
- Phase and earth faults

**SIMPLE CALCULATION OF SHORT CIRCUIT CURRENTS**
- Revision of simple formulae
- RMS and instantaneous, high-set, components
- Calculation of short circuit MVA and fault currents
- Faults close to generators, DC off-set and its effect on circuit breaker rating
- Worked examples

**SYSTEM EARTHING/GROUNDING**
- Solid, impedance, touch potentials etc
- Effect of electric shock on human beings
- Earth leakage protection
- Limitation due to grounding/earthing circuit impedance involving the cable armour (incl. obtaining cable armouring impedance data)

**PROTECTION SYSTEM COMPONENTS INCL. FUSES**
- History, construction, characteristics
- Energy, let-through, application
- Notations used in standards and by manufacturers

**INSTRUMENT TRANSFORMERS**
- Current transformers:
  - Construction, performance, specification, magnetisation, curves etc
- Voltage transformers: types, accuracy, connections
- Trend towards combining measurement and relaying requirements from common CTs and VTs. Special purpose CTs, e.g. bus-zone and differential protection
- Issues of modern relays generally requiring much less burden, hence small cable currents can be used e.g. 1 amp instead of 5 amps

**CIRCUIT BREAKERS**
- Purpose and duty, clearance times, types etc

**FUSE-CONTACTOR COMBINATIONS**
- Purpose and duty, clearance times, types
- Coordination required by the standards

**TRIPPING BATTERIES**
- Battery types, chargers, maintenance, DC circuitry closing, tripping, spring charging, indication and protective relay requirements for AC or DC supplies, detection of loss of auxiliary supplied, dual redundancy

**RELAYS**
- Inverse, definite minimum time (IDMT) relay – construction principles and setting
- Calculation of settings – practical examples
- New era – modern numerical relays and future trends
- Understanding modern notation

**PRACTICAL DEMONSTRATION SESSION**
- Including simple fault calculations, relay settings and checking a current transformer, magnetising curve etc

**APPLICATIONS CO-ORDINATED BY TIME GRADING**
- Problems in applying IDMT relays

**Topic 8.2 FUSES, RELAYS AND BATTERIES**

**PROTECTION TYPES**
- Differential protection – basic principles
- Active, incipient, passive, transient, asymmetrical, etc
- Stability, selectivity, sensitivity, speed
- Requirements, zones, types
- Inverse, definite minimum time (IDMT) relay
- Stator and rotor faults
- Reverse power/unbalanced loading
- Earth faults – core balance, residual stabilising resistors

**OVERHEAD LINE PROTECTION**
- Basic principles of the distance relay
- Tripping characteristics
- Application onto power lines
- Effect of load current and arc resistance
- Various schemes using power line carrier

**MANAGEMENT OF PROTECTION**
- Routine testing, annual testing, investigation and performance assessment, up-grading
- Organisation, training, records, access planning
You will learn how to:

- Describe best practice in grounding/earthing and its role in safety
- Evaluate safety against arc flash and take steps to mitigate danger by proper design, operation and maintenance
- Ensure lightning protection of structures, onshore and offshore facilities
- Design electrical and electronic systems correctly by applying knowledge of grounding/earthing principles

Overview

Electrical earthing plays a vital role in safety of personnel and equipment. This module explains the basics of earthing in a simple way so that its safety in oil and gas installations can be assured by correct application of the first principles. Electrical safety is an extensively legislated subject as the handling of electrical equipment has several inherent hazards. A brief overview of electrical safety legislation will also be given.

It is well established that lightning is the second most dangerous of all natural phenomena, (the first being flash floods) based on reported fatalities on a long-term average basis. Lightning can also cause extensive damage when it strikes buildings and facilities. Equipment failures and disruption of services on account of lightning strikes on electrical lines and substations is a matter of constant worry to T&D system managers. Protection of structures by lightning protection systems and electrical lines and substations by shield are discussed in elaborate detail as well as protection measures of offshore facilities.

* The terms grounding and earthing are understood to be interchangeable in this course but due to the larger readership the term earthing has been the preferred usage. Our apologies to our North American readers for this unfortunate compromise.

THE PROGRAM

**Topic 9.1**

**PRINCIPLES OF EARTHING**

- Major electrical safety hazards
- Earthing definitions
- Different objectives of earthing
- System earthing
- Types adopted
- Unearthed systems
- Comparison of solid earthing, resistance earthing
- Objectives of protective earthing
- Electric shock
- Touch and step voltage
- Sizing of earthing conductors
- Equipotential bonding

**Supply system classifications:** TN, TT and IT
- Earth fault sensing
- Onshore and offshore earthing examples
- Basics of earth electrodes
- Soil resistivity
- Enhancement measures
- Resistivity measurements
- Electrode configurations
- Chemical electrodes
- Corrosion and maintenance practices

**Topic 9.2**

**ARC FLASH AND MITIGATION**

- Arc flash - a major hazard of electricity
- Definitions of terms
- Arc hazards
- Bolted fault current and arc current
- The three degrees of burns
- Causes of arc faults
- Arc effects
- Burn injuries and impact
- Arc flash probability
- Arc flash protection program
- Hazard assessment
- Calculations as per IEEE 1584
- Incident energy and flash protection boundary
- Hazard Risk category
- Minimizing arc fault incidents through maintenance practices
- Arc containment measures
- Warning labels
- Fault current time reduction through better protection
- Selection of PPE and classes

**Topic 9.3**

**ELECTRICAL SAFETY PRINCIPLES**

- Safety through design-objectives
- Electric shock prevention
- Insulation and its role
- Insulation failures-reasons

- Enclosures
- Obstacles/shrouding
- Placing beyond reach
- Safe clearances from live components
- Fire hazards
- Basic rules; avoid, contain, sense, extinguish
- Fire protection of electrical equipment
- Electrical safety through isolation
- Isolation and switching - What is the difference?
- Earthing
- Safety interlocks
- Equipment selection
- Hazards during operation and maintenance
- Main indicators of problems
- Safety precautions during operation and maintenance
- Isolation and earthing as a safety measure
- Locking and tagging
- Switchyards-special safety measures
- Gas safety
- Safety legislation
- Organisational measures
- Safety policy
- Accident reporting and investigation
- Record keeping

**Topic 9.4**

**LIGHTNING PROTECTION OF STRUCTURES AND OTHER INSTALLATIONS**

- Basics of lightning and lightning protection
- Lightning physics
- Lightning effects: electrical, thermal and mechanical
- Direct and indirect effects
- Hazard assessment
- IEC 61662 ans AS 1768
- Types of damage and risk levels
- Protection basics and protection levels
- Protection design
- Zone of protection and evaluation methods
- Cone of protection and improvements - application to Franklin Rod type protection
- Rolling sphere method as applied to mesh type protection
- Air terminals
- Down conductors
- Earth electrodes
- Side flash-Inhibition by isolation or bonding
- Non conventional protection and pitfalls
- Protection of electrical lines and substations
You will learn how to:

- Develop a sound working knowledge of earthing and harmonics
- Protect equipment from surge and transient protection
- Design electrical and electronic systems correctly by applying knowledge of harmonics and earthing principles
- Describe applications for the latest technologies in correcting earthing, harmonics, surge, and transient problems
- Troubleshoot electrical and electronic system problems arising from poor power quality
- Isolate and rectify power quality problems

Overview

Supplying reliable electric power for critical systems is an essential part of modern industrial installations. Very often, the supply received from a distribution network has quality issues such as voltage sags/swells, transients, harmonics and interruptions. While it is impossible to guarantee 100% availability of power at all points in any system, vulnerable sections can be provided with alternative emergency power supply to ensure more reliable power availability, thereby avoiding the problems of power interruption. Measures against power interruptions, voltage variations, transients and harmonics will be discussed in this module.

THE PROGRAM

**Topic 10.1**
**INTRODUCTION TO POWER QUALITY AND DEALING WITH VOLTAGE VARIATIONS/INTERRUPTIONS**

- Definition of power quality
- Important quality aspects
- Why do electrical parameters vary?
- Typical power quality issues in practical systems
- Need for continuity of power supply
- Effect of interruptions on production and safety
- Direct and indirect costs
- Voltage variation and reasons
- Sag effects
- Swell effects
- Sensitivity curves
- Mitigation approaches

**Topic 10.2**
**SURGE PROTECTION**

- Surge coupling
- Resistive, inductive and capacitive coupling
- Surge mitigation
- Bonding of earthing systems
- Basic principle of surge protection
- Surge protection devices
- Basic types of SPD
- Voltage limiting type
- Voltage switching type
- Differences
- Application
- Graded surge protection
- Surge protection zones as per IEC
- SPD selection criteria
- Special considerations
- Typical protection for control loops
- Importance of correct earthing practices for sensitive equipment

**Topic 10.3**
**HARMONICS AND NOISE**

- Meaning of harmonics
- Linear loads
- Non linear loads
- Magnetic saturation and its effect
- Electronic switching and effects
- Typical waveforms of switch mode power supplies
- Harmonic components and Fourier transforms
- Non linear loads as harmonic current sources
- Problems cause by harmonics in rotating machines
- Problems due to zero crossing changes

**Topic 10.4**
**PF COMPENSATION AND PQ STUDIES**

- Active and reactive power
- Problems due to high reactive power
- Shunt capacitors for reduction of reactive power
- Synchronous compensators
- Series capacitors in transmission and distribution networks
- Compare parallel and series capacitors
- Dynamic compensation
- Applications of SVC [Static VAR Compensators]
- Power quality issues commonly found
- Normally adopted solutions
- Power quality studies
- Objectives of a study
- General Areas
- Levels of study as per IEEE 1100
- Level 1 study - objectives
- Aspects studied in level 1
- Level 2 study objectives
- Aspects studied in level 2
- Level 3 study and objectives
- Instruments used

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Module 11: Troubleshooting, Maintenance and Protection of AC Electrical Motors and Variable (or Adjustable) Speed Drives (VSDs) for Instrumentation and Control Systems

You will learn how to:

- Describe AC motor operation and construction
- Specify, select and install motors
- Specify protection requirements for motors
- Specify speed control requirements for motors
- Fix faults on motors
- Improve plant safety
- Describe how AC Variable Speed Drives (VSDs) work
- Install VSDs properly
- Troubleshoot VSDs

Overview

It is estimated that electrical drives and other rotating equipment consume about 50% of the total electrical energy consumed in the world today. The cost of maintaining electrical motors can be a significant amount in the budget item of manufacturing and mining industries. This module gives you a thorough understanding of electrical motor’s working, maintenance and failure modes and gives you the tools to maintain and troubleshoot electrical motors.

This module gives you a fundamental understanding of the installation, operation and troubleshooting of variable speed drives. Typical practical applications of VSD’s in process control and materials handling, such as those for pumping, ventilation, conveyers, compressors and hoists are covered in detail.

THE PROGRAM

Topic 11.1  
FUNDAMENTALS OF MOTOR TECHNOLOGY, AC MOTOR THEORY, CONSTRUCTION AND MAINTENANCE  
- Efficiency, torque, inertia, horsepower/power factor  
- Torque-speed curves  
- Basic construction and physical configuration, windings  
- Principles of operation and performance

Topic 11.2  
THREE PHASE AC INDUCTION MOTORS  
- Components and theory of operation  
- Induction motor design  
- Duty cycles, insulation and cooling requirements  
- Starting and selecting methods

DETERMINATION OF LOSSES AND EFFICIENCY  
- Standards and losses  
- Tests for measurement and computation of losses and efficiency  
- Dynamometers  
- Principles of load application by braking  
- Torque measurement basics

PROTECTION  
- Thermal overload, over current / overload  
- Under-voltage / over-voltage  
- Under frequency  
- Current unbalance or negative phase sequence  
- Earth fault protection  
- Pole slip / out of step  
- Loss of excitation  
- Inadvertent energization

Topic 11.3  
INTRODUCTION TO VARIABLE SPEED DRIVES and 3-PHASE AC INDUCTION MOTORS  
VARIABLE SPEED DRIVES (VSDs)  
- Types and principles of speed control  
- Efficiency, torque, inertia, horsepower/power factor  
- Calculating induction motor run-up  
- Torque-speed curves  
- Influence of varying frequency and applied voltage  
- Effects of harmonics in induction motors  
- Control of air-gap flux density

3-PHASE AC INDUCTION MOTORS  
- Types and principles of speed control  
- Efficiency, torque, inertia, horsepower/power factor  
- Calculating induction motor run-up  
- Torque-speed curves  
- Influence of varying frequency and applied voltage  
- Effects of harmonics in induction motors  
- Control of air-gap flux density

MISCELLANEOUS TOPICS  
- Non-hazardous and hazardous types  
- Hazardous type certificates and label markings  
- Inertia and torque-speed curves

Topic 11.4  
PWR ELECTRONIC CONVERTERS, ELECTROMAGNETIC COMPATIBILITY (EMC), PROTECTION  
PWR ELECTRONIC CONVERTERS  
- Power electronic and inverters  
- Gate commutated converters and gate controlled devices  
- 6, 12 and 24-pulse systems  
- PWM rectifier for AC converters

- Soft switching  
- ELECTROMAGNETIC COMPATIBILITY (EMC)  
- Electromagnetic interference  
- Effect of harmonic distortion  
- Thermal Overload Protection

PROTECTION OF MOTORS AND CONVERTERS  
- AC frequency converter protection  
- Fault diagnostics  
- Electric motor and thermal overload protection

Topic 11.5  
AC VARIABLE SPEED DRIVES, INSTALLATION AND FAULT FINDING TECHNIQUES  
CONTROL SYSTEM FOR AC VARIABLE SPEED DRIVES  
- Power supply and VSD control loops  
- Vector control  
- Current Feedback and speed feedback

THE SELECTION OF AC CONVERTERS FOR VARIABLE SPEED DRIVE APPLICATIONS  
- Operation in the constant power region  
- Nature of the machine Load  
- Starting and stopping VSDs  
- Calculating acceleration torques and times

INSTALLATION AND FAULT FINDING TECHNIQUES  
- General installation and environmental requirements  
- Installing contactors and AC converters

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You will learn how to:

- Demonstrate a good understanding of the basic hazards associated with electricity near flammable gases and vapours
- Design and install safe working systems in hazardous areas
- Perform simple classifications of hazardous areas
- Detail the types of apparatus that can be used in a given hazardous area
- Describe the system limitations in using hazardous areas protection
- Detail the key areas of the national Codes of Practice

Overview

During the phases of extraction and processing, prior to eventual use as fuels or feedstocks, the oil and gas industry handles ignitable substances; inadvertent combustion can and has caused major disasters and loss of life.

This practical module provides instruction on how explosion protection is applied. It looks at hazardous area terminology, together with the many basic principles involved and some applications to explain the subject.

The processes of area classification of plant design are introduced by examining the characteristics of flammable gasses and vapours. This forms the basis of the classification systems for equipment (i.e. grouping and temperature rating) such that suitably rated equipment can be selected for a given hazard. Thereafter, the requirements of installation, operation, inspection and maintenance aspects of such equipment used in hazardous areas are explained. The information is taken from the harmonised International Standard Series IEC60079.

Engineers in this industry must understand the workings of explosion protection systems and how they are implemented with respect to process plant, control and instrumentation and other electrical equipment. This is so that safety is designed into the process plant and is managed technically and organizationally for its operational life.

THE PROGRAM

Topic 12.1
INTRODUCTION TO CLASSIFICATION PRINCIPLES

INTRODUCTION
- Accidents and explosion consequences
- Definition of hazardous area
- Introduction to standards, testing Authorities and equipment certification

FLAMMABILITY CHARACTERISTICS
- Properties of flammable gases
- Ignition sources
- Use of electricity
- Protection requirements

AREA CLASSIFICATION
- Definitions
- Risk assessment
- Normal and abnormal plant operation
- Sources of release
- Assessment procedures
- Ventilation consideration
- Zoning principles
- Examples
- Documentation

EQUIPMENT CLASSIFICATION SYSTEMS
- Classification of apparatus
- Equipment grouping and temperature rating
- Labeling on equipment
- Overview of types of protection and comparison

Topic 12.2
PRINCIPLES OF TYPES OF PROTECTION

EXPLOSION PROTECTION CONCEPTS
- Definition, principles and applications

FLAMEPROMOOF CONCEPT Ex d
- Flamepath attributes as part of enclosure design

INCREASED SAFETY CONCEPT Ex e
- High integrity connection and insulation quality

NON SPARKING CONCEPT Ex n
- Basic protection for zone 2 only

INTRINSIC SAFETY CONCEPT Ex i
- Systems approach useful for instrumentation circuits

PRESSURISATION CONCEPT Ex p
- Artificial safe area creation permits wide variety of applications

OTHER TYPES OF PROTECTION;
- Lesser known types: Ex o, q, m and s
- Advantages and limitations

COMBINED PROTECTION
- Using combinations of protection to solve application problems

Topic 12.3
INSTALLER AND USER PRACTICES

EARTHING AND BONDING
- Basic terminology and principles
- Reasons for good earthing practice
- Fault current routing consideration
- Noise and interference control for instrumentation
- Static discharge paths
- Lightning and surge protection
- Electric shock, step and touch potentials, IEEE 80

SELECTION AND INSTALLATION OF EX EQUIPMENT
- Equipment selection criteria
- Documentation requirements
- Structure of code of practice
- Precautionary requirements
- Cabling requirements

INSPECTION AND MAINTENANCE OF EX EQUIPMENT
- Types of inspection
- Integration with planned maintenance
- Procedures
- Key activities
- Repair of equipment

STANDARDS, CERTIFICATION, MARKING, AND THE ATEX DIRECTIVE
- Summary of standards and codes of practice
- Summary of certification
- Scope of directive
- Conformity verification
Module 13: Electrical Applications to an Oil and Gas Platform and Site

You will learn how to:

- Consider all electrical problems holistically combining elements of grounding/earthing/protection/hazardous areas/switchgear
- Work in groups drawing on each other experience in solving four case studies

Four case studies will be undertaken on applications of the various modules in the electrical section.

THE PROGRAM

Topic 13.1
CASE STUDIES INVOLVING SUSTAINABLE ENERGY AND HARMONIC PROBLEM SOLVING
- Meaning of sustainability
- Fundamental principles
- Sustainability indicators
- Applicability of sustainability to industrial activities
- Sustainability in oil and gas terms
- Case study: power source of Yokon Mines and reason for selecting natural gas
- Case study: LNG plant in Yemen, selection of motors for LNG gas compressor drives
- Case study: harmonic resonance in an industrial system
- Case study: cable ship harmonic problem
- Case study: harmonic problem in offshore platform

Topic 13.2
CASE STUDIES INVOLVING HAZARDS DUE TO NATURAL FACTORS LIKE LIGHTNING AND PREVENTION OF ACCIDENTS
- Fires in oil installations
- Case study on refinery fire
- Case study on oil rig fire
- Case study on a major refinery fire
- Case study of fire in an Egyptian oil processing plant
- Lightning as a source of fires
- Reduction of hazards
- Static electricity as a source of fires
- Control of static electricity
- Static problem areas in oil and gas industry
- Special situations needing attention
Module 14: General Instrumentation Standards in Oil and Gas and Best Practice in Process, Electrical & Instrumentation Drawings and Documentation

You will learn how to:
- Demonstrate an understanding of the different national and international standards used in the oil and sector ranging from those of ISA to IEC.
- Integrate these standards into your engineering design and installation work.
- Commence the instrumentation section of the advanced diploma effectively.
- Oil and gas standards in electrical and instrumentation.
- Summary of instrumentation topics to be covered.
- Work with process flow diagrams, P&IDs, instrument lists, specification forms, logic diagrams, location plans, installation details and instrument loop diagrams, instrument hook ups and other design documentation.
- Describe process control devices and the symbols used to define them.
- Specify vendor criteria for the production of plant documentation to the order of the company.
- Describe the appropriate ISA standards available to assist in developing and understanding instrument and control documents.

Overview

The module will serve as an introduction to the local, national and international standards used in the oil and gas field.

This module is designed for engineers and technicians from a wide range of abilities and backgrounds and will provide an excellent introduction to mastering plant documentation and diagrams, covers the flow of documentation from design through manufacture to maintenance and operations. The module looks at the applications of each diagram type detailing where and when the document should be used.

During the life span of any plant, a multitude of different vendors will supply plant modifications and equipment as the plant is continuously enhanced. The quality of the documentation produced will vary enormously with each new supplier. You will be given the skills to apply a standardised internationally acceptable set of standards to your plant documentation.

THE PROGRAM

Topic 14.1
DRAWING TYPES AND STANDARDS AND FUNDAMENTALS
INTRODUCTION
- The role of plant documentation, standards and specifications.
- Understanding diagram layouts and formats.
- Cross references.
- ISO 9002 and document control.
- API RP14F – Section 12.2 – electronic instrumentation.
- ISA Standards Library for Automation and Control.
- Specification forms – ISA S20 – specification forms for process measurement and control.

FUNDAMENTALS
- Relays.
- Transducers.
- Switches.
- Gate logic.
- Fail safe design.

ELECTRICAL
- Electrical standards.
- Electrical document types.
- Main circuits.
- Control circuits.
- Symbols.
- Nomenclature.
- Hands on determine function, fault-finding.

Topic 14.2
PIPING AND INSTRUMENT DIAGRAMS (P&ID), INSTRUMENTATION AND ELECTRICAL
PIPING AND INSTRUMENT DIAGRAMS (P&ID)
- Process flow diagrams.
- An introduction to the PFD, P&ID, UFID, MFD.
- Control loops on the P&ID.
- HAZOP.
- Mass balance.
- Functional spec.

INSTRUMENTATION
- Document types.
- Instrument lists.
- Logic diagrams.
- Wiring diagrams.
- Indexes.
- Schedules and lists.
- Block diagrams.
- Data sheets.
- Loop diagrams.
- Hands on circuit function.
- Fault finding.
- Standards and symbols.
- Nomenclature.

Topic 14.3
PNEUMATICS & HYDRAULICS, LADDER LOGIC AND ELECTRO PNEUMATIC CIRCUITS
PNEUMATICS & HYDRAULICS
- Introduction.
- Standards.
- Layout and symbols.
- Basic circuits.
- Deducing principle of operation.
- Hands on session.

LADDER LOGIC
- Introduction and overview.
- Standards and layout.
- Power supply circuits.
- Hands on circuit design.

ELECTRO PNEUMATIC CIRCUITS
- Overview.
- Truth tables.
- Fault finding.
- Principle of operation.

PRACTICAL EXERCISES DURING THE MODULE
- Develop basic Hydraulic, instrumentation and pneumatic drawings.
- Develop P&ID drawings for pressure, temperature, flow and level loops.
- Detail the documentation for typical instruments.
- Proceed through development of a full plant set of drawings from flow diagrams and process description to P&ID, electrical, Hydraulic and pneumatic symbols.
- Use software to undertake these typical tasks.

INSTRUMENTATION ACRONYMS
- A list of common acronyms (e.g. P&ID).
Overview

A clear understanding and application of instrument design, specification, selection, commissioning and maintenance principles is the most important factor in an efficient process system. True control of processes can only be achieved when instrumentation provides the correct information. This module focuses on real applications, with attention to special installation considerations and application limitations when selecting or installing different measurement or control equipment.

You will learn how to:

- Specify and design instrumentation systems for pressure, level, temperature, flow, and other process/plant parameters
- Correctly select and size control valves for industrial use
- Predict and avoid the problems with installing measurement equipment
- Troubleshoot instrumentation systems and control valves
- Describe most of the major technologies used for instrumentation and control valves

THE PROGRAM

Topic 15.1 INTRODUCTION TO PROCESS MEASUREMENT
- Basic measurement concepts
- Definition of terminology
- Measuring instruments and control valves as part of the overall control system
- Pressure, level, temperature and flow overview
- Overview of control valves
- Instrument tubing, fittings and accessories
- Pneumatic instrumentation systems
- Hydraulic instrumentation and controls
- Essential safety considerations
- Instrumentation process interface
- Double block and bleed valves
- Monoflanges and instrument manifolds
- Process close close coupling techniques

Topic 15.2 PRESSURE MEASUREMENT
- Principle of pressure measurement
- Load cells
- Pressure sources
- Pressure transducers, transmitters, gauges, indicators, switches, elements and accessories
- Specifications
- Pressure relief valves, rupture discs
- Installation considerations
- Impact on the overall control loop
- Future technologies

Topic 15.3 LEVEL MEASUREMENT
- Principles of level measurement
- Simple sight glasses
- Level gauges
- Bubbler systems
- Displacer
- Differential systems, with and without capillary seals
- Magnetic float type (preferred for offshore applications due to high integrity & adaptability)
- Capacitance
- Nucleonic
- Buoyancy tape systems
- Hydrostatic pressure
- Radar and microwave
- Ultrasonic measurement
- Radiation measurement
- Electrical measurement
- Density measurement
- Fiscal measurement of level
- Profiling techniques
- Level transmitters
- Level calculations
- Elevation and suppression
- Reference legs
- Level switches
- Tank gauging equipment
- Installation considerations
- Impact on the overall control loop
- Future technologies

Topic 15.4 TEMPERATURE MEASUREMENT
- Principles
- Thermowells
- Temperature transmitters
- Natural frequency and vibration checks
- Thermocouples
- Resistance Temperature Detectors (RTDs)
- Thermistors
- Liquid in glass, filled, bimetallic
- Pyrometers
- Installation considerations
- Impact on the overall control loop

Topic 15.5 FLOW MEASUREMENT
- Principles of flow measurement
- Flow calculations, standards, straight lengths etc. basic considerations
- Open channel flow measurement
- Oscillatory flow measurement
- Vortex flow meters
- Orifice plates – DP transmitters
- Pitot tubes – annubars
- Turbine meters
- Magnetic flowmeters
- K factors

Topic 15.6 CONTROL VALVES
- Principles of control valves
- Control valve types: globe valves, cage valves, butterfly valves, ball valves
- Control valves selection
- Control valve bodies (practical session)
- Control valves characteristics/trim
- Control valve noise and cavitation
- Actuators and positioners operation
- Valve calibration and stroking
- Installation considerations
- Impact on the overall control loop
- Future technologies (practical session)

Topic 15.7 PROCESS CONSIDERATIONS
- Transmitters
- Noise, materials of construction

Topic 15.8 INTEGRATION OF THE SYSTEM
- Tank farm Instrumentation
- Calculation of individual instrument error and total error for the system
- Integration of the pressure, level, temperature and flow systems
- Integration of new smart subsystems with data communication links
- Testing and commissioning of the subsystems
You will learn how to:

- Apply correct practice to installation, calibration and maintenance of instruments
- Calibrate electronic transmitters and controllers
- Configure instruments correctly to vendor instruction sheets
- Specify instrument and loop documentation requirements and standards to vendors
- Fault find with drawings
- Carry out simple repair procedures for the correction of faults on instrument systems where possible

Overview

This module is designed for engineers and technicians from a wide range of abilities and backgrounds and will provide an excellent introduction and hands-on experience in installation, calibration, commissioning and maintenance of electronic instrumentation. The module is initiated with coverage of the basics on electrical measurements and some tips and tricks. Instrument performance and calibration principles are then covered with rules for calibrating transmitters. Hereafter the procedures for calibrating and installing smart transmitters are covered. Typical documentation requirements for instruments are examined with a focus on instrument data sheets, P&ID’s and wiring diagrams. During the life span of any plant, a multitude of different vendors will supply plant modifications and equipment as the plant is continuously enhanced. The quality of the documentation produced will vary enormously with each new supplier. Instruments in hazardous areas are then detailed. The module is then finalised with a discussion on integration of the entire system and testing and commissioning procedures for instruments detailed.
You will learn how to:

- Define the fundamentals of process control and new techniques
- Tune PID control loops
- Correct stability problems
- Configure cascade loops, feed forward control and ratio control
- Identify and correct problems with dead time in the process
- Define what happens inside a control valve from basic fluid mechanics point of view
- Appreciate the difference between cavitation and flashing, and know what choked flow is
- Do simple calculations to determine CV values
- Recognise severe service applications and have an appreciation for the methods of tackling the problems associated with such applications
- Know about all the different types of control valves commonly in use and understand the relative advantages of each
- Choose between different characteristics on offer and specify seat leakage rates
- Be able to size actuators for linear and rotary applications and know the relative advantages of pneumatic, hydraulic and electric types.
- Have a basic understanding on how to select materials for bodies, trims, packing boxes, and gaskets
- Make use of a computer sizing program to assist with the selection of control valves
- Understand the failure modes for control valves and demonstrate new approaches to trouble shooting

Overview

This module covers all the essentials of process control and tools to optimise the operation of your plant and process, including the ability to perform effective loop tuning. This module is aimed at engineers and technicians who wish to have a clear, practical understanding of the essentials of process control and loop tuning, as well as how to optimise the operation of their particular plant or process. These persons would typically be primarily involved in the design, implementation and upgrading of industrial control systems. Mathematical theory has been kept to a minimum with the emphasis throughout on practical applications and useful information.

It is claimed that the majority of control valves throughout the world have not been correctly sized and that large numbers operate on manual mode. Whether this is true or not is difficult to establish but we do know that the method of sizing and selecting a control valve for a specific application is generally not well understood. Although there are many factors that need to be taken into account the subject is not difficult to understand if dealt with in a logical manner.

We also find that many maintenance problems result from people treating the symptoms of a problem rather than tackling the true cause – a basic understanding of the principles is all that is usually needed to solve the problem for good.

THE PROGRAM

Topic 17.1 PRACTICAL PROCESS CONTROL INTRODUCTION, INSTRUMENTATION BASICS, AND CONTROL VALVE INTRODUCTORY CONCEPTS
- Basic control concepts
- Introduction to sensors and transmitters
- Introduction to control valves
- Basic principles of control systems

Topic 17.2 PRACTICAL PROCESS CONTROL PRINCIPLES AND LOOP TUNING
- Stability and control modes of closed loops
- Digital control principles
- Ideal PID vs real PID
- Tuning of closed loop control
- Cascade control

Topic 17.3 PRACTICAL ADVANCED CONTROL CONCEPTS AND SYSTEMS
- Feed forward control
- Combined feedback and feed forward control
- Long dead-time in closed loop control
- Expert system and model based self tuning controllers

Topic 17.4 PRACTICAL CONTROL VALVE ESSENTIALS AND CAPABILITIES
- Introduction to control valve theory
- Different types of control valves
- Characteristics
- High pressure drop applications

Topic 17.5 PRACTICAL SIZING OF CONTROL VALVES, ACTUATION AND ESSENTIAL ACCESSORIES
- Use of computer programs for valve sizing
- Examples of high pressure drop applications
- Actuators
- Positioners
- Pneumatic circuits

Topic 17.6 PRACTICAL CONTROL VALVE MATERIAL, STANDARDS, APPLICATIONS, MAINTENANCE AND INSTALLATION
- Materials
- Quality standards
- Severe service applications
- Pressure relief valves
- Installation / maintenance
Module 18: Programmable Logic Controllers

You will learn how to:
- Specify PLC hardware and installation criteria
- Describe PLC software structure
- Write medium level PLC programs (using ladderlogic)
- Troubleshoot a typical PLC system
- Specify PLC systems

Overview
This module is designed to benefit you with practical up-to-date information on the application of PLCs to the automation and process control of plants and factories. It is suitable for people who have little or no exposure to PLCs but expect to become involved in some or all aspects of PLC installation. It aims to give practical advice from experts in the field, to assist you to correctly plan, program and install a PLC with a shorter learning curve and more confidence. While the module is ideal for electricians, technicians and engineers who are new to PLCs, much of the module and additional material in the extensive manual will be of value to those who already have some basic skills, but need a wider perspective for larger and more challenging tasks ahead. The information contained in this module advances from the basics to challenge even the most experienced engineer in the industry today.

THE PROGRAM

Topic 18.1 PROGRAMMABLE LOGIC CONTROLLERS (PLCs)
- Introduction to PLCs
- A brief history of PLCs
- Alternative control systems – where do PLCs fit in?
- Why PLCs have become so widely accepted
- Lingerings concerns about PLCs

FUNDAMENTALS OF PLC HARDWARE
- Block diagram of typical PLC
- PLC processor module – memory organisation
- Input / output section – module types
- Power supplies

FUNDAMENTALS OF PLC SOFTWARE
- Methods of representing logic
  - Boolean algebra
  - Instruction code
  - Graphical presentation
  - Functional logic diagrams
  - Ladder logic
- Fundamental ladder logic instruction set
- Comparison of different manufacturers
  - Memory and data representation
  - Instruction code

USING LADDER LOGIC FOR SIMPLE DIGITAL FUNCTIONS
- The basic rules
- Comparison with relay ladder diagrams
- The concept of the "scan" and how to apply it
- Infinite fan-out
- Contact "normal" states
- Positive and negative logic
- Basic Boolean functions
- The usefulness of De Morgan’s Law

USING REGISTERS (WORDS)
- Number systems
- Types of register data
- Timers
- Counters
- Bit shift / rotate
- Table functions
- Register [matrix] logic functions

Topic 18.2 APPLICATION SOFTWARE & ADVANCED CONTROL

GOOD PROGRAMMING HABITS
- Keeping track of addresses and data used
- Looking ahead – how will programs be maintained
- Practical methods to improve program quality
  - Organisation of code, through documentation, simplifying changes

GOOD INSTALLATION PRACTICE
- Location of hardware
- Good wiring practice
  - Cable spacing
  - Power distribution
  - Wire numbering
- Reducing noise and interference
- Screening and shielding

ADVANCED CONTROL WITH PLC’S
- The concept of reusable logic - examples: drive logic, alarm handling
- Use of advanced programming functions
- Matrix logic
- Table functions and indirect addressing

EXAMPLES: SIMPLE DISPLAY DRIVER

BATCH PROCESSES AND SEQUENTIAL CONTROL
- Remembering the program state
- Creating a “stepper”
- Step advance
- Fault detection and recovery
- Operator Intervention
- Multiple recipes or alternate paths
- Sequential function charts

PID CONTROL
- The importance of timing and scan time
- When PID is not always appropriate:
  - intermittent measurements
  - long transport delays

Topic 18.3 SAFETY PROGRAMMABLE SYSTEMS
- Why regular PLCs should not be used for safety functions
- Programmable electronic logic solvers
- Safety certification
- Certified programming systems
- Application examples
- Growth of networked safety devices and certified networks
- Integrated safety systems

DATA COMMUNICATIONS
- Interface standards, RS-232, RS-422/423, RS-485
- Protocols, Modbus & DH+
- Local area networks, Ethernet and Token Bus
- Monitoring communication links and simple watchdog timers

INTRODUCTION TO IEC 61131-3
- Concepts
- Common elements
- Programming languages: structured text
- Function block diagrams
- Ladder diagrams
- Instruction list
- Sequential function chart
- OPEC
- Introduction to OPC
- What is OPC?
- Architecture

SYSTEM CHECKOUT AND TESTING
- Development and verification of code
- Factory acceptance testing
- Testing procedures
- Emulating missing hardware
- Emulating process responses
You will learn how to:

- Describe the fundamentals of SCADA systems
- List the essentials of SCADA software configuration
- Apply the tricks and tips in installation of SCADA systems
- Describe the essentials of telecommunications links
- Apply Industrial Ethernet in SCADA systems
- Apply SCADA network security issues
- Troubleshoot SCADA systems
- Describe the architecture and operation of Distributed Control Systems
- Design the overall DCS and process control system
- Specify, select and install DCSs
- Apply key ergonomic issues in design of operator displays
- Design and create a consistent and effective alarm philosophy for your installation
- Recognise and deal with human problems in interfacing to alarm systems

Overview

SCADA has traditionally meant a window into the process of a plant or gathering of data from devices in the field, but now the focus is on integrating this process data into the actual business and using it in real time. The emphasis today, is on using Open Standards such as communication protocols (eg. IEC 60870, DNP3 and TCP/IP) and ‘off-the-shelf’ hardware and software to keep the costs down. This comprehensive module covers the essentials of SCADA systems.

The first section covers SCADA system from the point of view of the systems covering a wide geographical area such as water and electrical utilities. This gives an introduction to the SCADA hardware and software. The second section covers the SCADA system from the point of view of the equipment required within a process plant. This gives an introduction to the SCADA hardware and software then focuses on the main plant communication systems using Industrial Ethernet and Fieldbus. Finally, there is an examination of many of the common issues involved in all SCADA systems. These include Alarm Management, Human Management Interface (HMI), Network Security, SCADA Historians, Troubleshooting, Maintenance and Specification issues.

This module will cover the practical applications of the modern distributed control system (DCS). Whilst all control systems are distributed to a certain extent today and there is a definite merging of the concepts of DCS, Programmable Logic Controller (PLC) and SCADA.

THE PROGRAM

Topic 19.1
SCADA FOR MONITORING INSTALLATIONS ACROSS A WIDE GEOGRAPHIC AREA

- Introduction
- Overview of wide area SCADA systems
- SCADA system hardware
- SCADA system software
- Communication protocols

Topic 19.2
SCADA FOR PROCESS PLANT INSTALLATIONS AND COMMON ISSUES

- Introduction
- Overview of process plant SCADA systems
- SCADA system hardware
- SCADA system software
- SCADA alarm management
- Human Management Interface (HMI)
- SCADA network security
- SCADA historian
- Troubleshooting issues
- SCADA system maintenance
- SCADA system installation and commissioning

Topic 19.3
LOOKING AT THE DCS - WHAT DOES IT PROVIDE US WITH?

- Summary of typical distributed control systems
- DCS vs SCADA vs PLCs
- DCS system elements
- Data communications
- The basic controller
- Basic DCS controller configuration
- Advanced controllers
- Programming of DCS systems
- Uninterrupted operation and security issues

Topic 19.4
ALARMS, CONTROLS AND OPERATOR CONSIDERATIONS

- The operator interface
- Alarm management for DCSs
- Distributed control system reporting
- Distributed control system configuration
- Advanced control strategies
- Maintenance considerations
- Distributed control system applications
- Comparison of offerings from DCS vendors
- Among the practical sessions
You will learn how to:

- Apply best practice in industrial data communications design, installation and commissioning
- Test industrial data communications based protocols running over copper and fiber based cabling
- Design and install your own fully operational industrial communications systems
- Integrate different industrial communications protocols and standards into a complete working system

Overview

The objective of this module is to outline the best practice in designing, installing, commissioning and troubleshooting industrial data communications systems. In any given plant, factory or installation there are a myriad of different industrial communications standards used and the key to successful implementation is the degree to which the entire system integrates and works together.

With the vast number of different technologies and standards currently on the market, the debate is not “what is the best”, but rather how does industry assess and select the most appropriate for given applications. (Foundation Fieldbus, Profibus, DeviceNet, Industrial Ethernet, Fiber Optic, Copper, Wireless) – then ensuring that best practice is followed in designing, installing and commissioning the data communication links to ensure they run fault-free.

The industrial data communications systems in your plant underpin your entire operation. It is critical that you apply best practice in designing, installing, troubleshooting and fixing any problems that may occur.

This module distills all the tips and tricks learnt with the benefit of many years of experience. You will learn the best, proven practices to follow.

The main steps in using today's communications technologies today involve selecting the correct technology and standards for your plant based on your requirements; doing the design of the overall system; installing the cabling and then commissioning the system.

Fiber Optic cabling is generally accepted as the best approach for the physical communications but there are obviously areas where you will be forced to use copper wiring and/or, wireless communications. This module outlines the critical rules followed in installing the data communications physical transport media and then ensuring that the installation will be trouble-free for years to come.

You are not required to know the minute details of the actual protocols used, but rather how to select, install and maintain it in the most cost effective and beneficial manner.

THE PROGRAM

Topic 20.1
INTRODUCTION AND FUNDAMENTALS

- Overview of the module
- OSI model
- Systems engineering approach
- Attributes of typical communications systems - media, physical connections, protocols, applications
- General issues - noise, earthing, shielding, protection against dust and moisture (IP ratings)
- Copper/fiber - cable standards, cable distribution standards, connector standards, EMC conformance standards, splicing, connector attachment, drivers and detectors, grounding/earthing, termination, protection against transients
- Physical layer standards - EIA-232, EIA-485, 4-20 mA, IEC 61158-2 [Intrinsic safety]
- Industrial networks - industrial Ethernet, ASI, DeviceNet, Profibus, Foundation Fieldbus, Modbus Plus, Data Highway Plus, HART, Ethernet/IP, ControlNet, Profinet, Foundation Fieldbus HSE
- Industrial protocols - TCP/IP, Modbus, Modbus TCP, DNP3, GOB70 SCADA
- Other technologies - VSAT, Wireless LAN, Wireless point to point

Topic 20.2
SELECTING AND INSTALLATION METHODOLOGY

- Which standards/technologies to use: Field management (device) level, process management (operator) level, business management (enterprise) level, long distance SCADA/telemetry links
- Copper cabling and connectors - system design, installation, tips, tricks and pitfalls
- Fiber cabling and connectors - system design, installation, tips, tricks and pitfalls
- Wireless - system design, installation, tips, tricks and pitfalls

Topic 20.3
COMMISSIONING/TESTING/TROUBLESHOOTING

- Copper infrastructure
- Fiber infrastructure
- Wireless infrastructure
- Networks
  - physical layer issues (OSI Layer 1)
  - data link layer issues (OSI Layer 2)
  - network layer issues (OSI Layer 3)
  - transport layer issues (OSI Layer 4)
  - application and "user" layer issues (OSI Layers 7-8*)
  - client/server issues

Practical Exercises:

There are several practical sessions and exercises you will undertake to give you a solid basis to the material you cover in the module. These will be mainly conducted in the remote lab working from your remote PC:

- Do a fiber loss calculation [using spreadsheet]
- Doing a simple Path Loss calculation [using spreadsheet]
- Testing RS-232 link and RS-485 links remotely
- Setting up networks: Ethernet/DeviceNet
- Using a protocol analyser
- Troubleshooting and debugging Modbus and TCP/IP protocols.
- Designing a complete system
- Plus many others (taken from our other specialised communications classes) time permitting.
You will learn how to:

- Create a checklist that you can use to quickly access if your plant complies with the latest international safety standards
- Describe the key features of the IEC 61511 and IEC 61508 which you can apply immediately to your plant
- Comply with the IEC 61511 and IEC 61508 standards thus signifying that your company is following the best available safety practices for a process company
- Determine required SIL ratings using at least 3 different methods as listed in IEC 61511. This has the potential to save costs by avoiding needlessly high specifications for your trip systems
- Configure safety systems to minimise or avoid spurious trips and create the potential to reduce production losses
- Know what can be done and what should not be done with PLCs and smart sensors
- Understand the term combined safety system and how the fire and gas logic is incorporated
- Know how to take advantage of smart positioners and other self testing devices to reduce down time needed for proof testing
- Have overall knowledge of the key design and procedural requirements of IEC 61511 to ensure your safety systems comply with the best international codes of practice.

Overview

For project managers and engineers involved with hazardous processes, this module focuses on the management, planning and execution of automatic safety systems in accordance with IEC 61511, the newly released international standard for process industry safety controls. (See over for background to IEC 61511).

IEC 61511 has been recognised by European safety authorities and by USA based process companies as representing the best practices available for the provision of automatic safety systems. The new standard captures many of the well established project and design techniques that have been described since 1996 in ANSI/ISA standard S84 whilst introducing many newer principles based on the master standard IEC 61508. The newly released standard IEC 61511 (published in 3 parts) combines the principles of IEC 61508 and S84 into a practical and easily understood code of practice specifically for end users in the process industries.

This module is structured into two major parts to ensure that both managers and engineering staff are trained in the fundamentals of safety system practices. The first part of the module, approx the first third, provides an overview of the critical issues involved in managing and implementing safety systems.
Module 22: Wellhead and Flowline Control Systems

You will learn how to:

- Describe key features of wellhead and flowline control
- Design wellhead control and instrumentation systems
- Performing simple calculations for wellhead and flowline systems

Overview

This module covers the essentials of instrumentation and control relating to wellhead and flowline control systems.

THE PROGRAM

Topic 22.1
WELL CONTROL

- Basic considerations
- Causes of kicks
- Kick detection
- Pressure concepts and calculations
- Procedures
- Gas Characteristics and behaviours
- Fluids
- Constant bottomhole pressure well control methods

Topic 22.2
WELL INFORMATION COLLECTION, USE, AND MANAGEMENT

- Equipment - Blow Out Preventor (BOP) Configuration, manifolds and piping, auxiliary well control equipment, BOP closing unit – function and performance, testing/completion pressure control equipment, pressure and function tests
- Well control equipment arrangements
- Well control related instrumentation
- Control systems.
- Wellhead control panels
- Standards

Module 23: Oil and Gas Specific Applications Floating Production, Storage and Offloading (FPSO) Facilities

You will learn how to:

- Apply smart maintenance techniques to your oil and gas installation
- Work with instrumentation and safety systems on cranes
- Perform simple settings on compressor surge control systems

Overview

This module covers some miscellaneous systems, which are not covered in the core engineering parts of the module and are detailed below in the program.

THE PROGRAM

Topic 23.1
SMART MAINTENANCE TECHNIQUES AND KEY PLATFORM SYSTEMS

- Smart maintenance techniques
- Cranes – instrumentation and safety systems
- Platform navigational audible warnings/signals
- Compressor surge control – basic considerations

Topic 23.2
PROCESS SAFETY AND EMERGENCY RESPONSE SYSTEMS

- Flare flame front generator and ignition monitoring system
- Communication and alarm systems – public address systems. Audible and visual alarms. Status lights. basic considerations