Gain cutting edge expertise with this prestigious, practical ADVANCED DIPLOMA

Advanced Diploma of MECHANICAL ENGINEERING TECHNOLOGY**

Take your existing skills in mechanical engineering or industrial technology and boost your career with practical knowledge of the latest technologies in this fast growing but critical field.

Ensure that you and your company remain at the forefront of Mechanical Engineering Technology.

Through innovative e-learning participate from your home, office or facility.

WHAT YOU WILL GAIN:

- Skills and know-how in the latest technologies in mechanical engineering technology.
- Hard-hitting know-how in pumps, compressors, piping, seals and machinery safety.
- Guidance from experts in the field of mechanical engineering technology.
- Networking with contacts in the industry.
- Improved career prospects and income.
- A world-recognised EIT Advanced Diploma of Mechanical Engineering Technology.

Visit our website: www.eit.edu.au

** A note regarding recognition of this program in the Australian education system: EIT’s sister company, IDC Technologies, is the owner of this program. The qualification 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 program to students worldwide.
Introduction

Gain deep and broad skills by undertaking this advanced diploma in mechanical engineering technology - focusing on real, practical systems.

Embrace a well paid, intensive yet enjoyable career by taking this comprehensive and practical program, delivered by live distance learning and presented by outstanding mechanical engineering lecturers located throughout the world.

Whilst there is probably not a serious shortage of theoretically oriented practitioners in mechanical engineering, there is a shortage of highly skilled practically oriented mechanical technologists and engineers in the world today, due to the new technologies only recently becoming a key component of all modern plants, factories and offices. The critical shortage of experts in the area has been accentuated by retirement, restructuring and rapid growth in new industries and technologies. This is regardless of the recession in many countries. Many businesses throughout the world comment on the difficulty in finding experienced mechanical engineers and technologists despite paying outstanding salaries. For example, about two years ago a need developed for mechanical technologists and engineers in building process plants. The interface from the traditional SCADA and industrial automation system to the web and to mechanical equipment has also created a new need for expertise in these areas. Specialists in these areas are few and far between.

Many of these universities and colleges that do teach these topics focus more on the theoretical aspects of mechanical engineering technologies and lecturers often have little experience in industry due to the difficulty in attracting good engineers and technologists from the highly paid private sector. This program tackles the subject from a practical point of view.

The aim of this 18 month e-learning program is to provide you with core skills in working with mechanical engineering technology and systems and to take advantage of the growing need by industry here.

The topics that will be covered are derived from the acclaimed IDC Technologies’ programs attended by over 500,000 engineers and technicians during the past 20 years. The program is composed of 72 topics which cover five engineering threads to provide you with maximum practical coverage in the field of mechanical engineering. The five threads running through this program are:

- Fundamentals of Mechanical Engineering Technologies
- Applications of Mechanical Engineering Technologies
- Energy Systems
- Industrial Automation
- Management

“This has been the best study process I have gone through and for advancing the career it is a must. The program content is extremely good and practical as I have baffled my engineers with some of the questions in the assignments making them question the content they actually studied.”  
Henk Barnard

“This is ideal for people such as myself that don’t live or work in a city environment. It is the only viable way of increasing knowledge whilst working full time on a fly-in-out roster pattern.”  
Brett Lapham

“When you are in a particular field and profession for a long time you rather think you know it all. This program has made me realize that there are new things to learn every day especially with the ever changing technology.”  
Stephen Dzveya

VALUE plus!

As part of the incredible value we have built into this program, you also receive:

- Two places on any IDC Technologies public 2-day workshop*
- OR
- Two places at any IDC Technologies conference (conference component only, excludes workshop if available)*

PLUS

- A library of 30 technical eBooks

All of this is valued at over US$5000! You may also be eligible for a tax deduction on your personal income tax – contact your tax advisor for more information.

*to be used within 2 years of program enrolment and subject to availability. Your fee for this program must be up to date. The offer is for workshop or conference fee only and does not include travel, accommodation or other costs. The EIT is not responsible for cancellation or postponement of IDC Technologies workshops and conferences. Other conditions may apply at our discretion.

EIT Program Delivery Methodology

Not all e-learning is the same. See why our methodology is so unique and successful.

Visit:  
Accreditation & International Standing for Online Engineering Training

The EIT ([and many individual programs]) has received recognition, endorsement and/or accreditation as a training provider from authorizing bodies based around the world, including those listed below. Please ask us for specific information for your location.

AUSTRALIA
The Engineering Institute of Technology was declared an educational institution under Section 10 of the copyright Act 1968. The notice was published in accordance with section 10A(4) of the act in the Commonwealth of Australia’s Business Gazette [number B56]: “The Engineering Institute of Technology declares that its principal function is the provision of programs of study or training for the following purpose: the continuing education of people engaged in a particular profession or occupation.” – Dated 8th November 2011.

The Engineering Institute of Technology (EIT) is a private Registered Training Organization (RTO) – provider number 51971. EIT is registered with and regulated by the Australian Skills Quality Authority (ASQA). ASQA is the national regulator for Australia’s vocational education and training sector. They regulate programs and training providers to ensure nationally approved quality standards are met.

Many of the programs offered by EIT are nationally accredited and recognized qualifications and are listed on training.gov.au (TGA). TGA is the official National Register of information on Training Packages, Qualifications, Programs, Units of Competency and Registered Training Organizations (RTOs). EIT qualifications accredited to date can be viewed on EIT’s website. South African students who successfully complete an EIT Advanced Diploma and other qualifications have the option to apply for recognition by SAQA, who have determined in the past that an Australian Advanced Diploma program is at Level 6 in the South African National Qualifications Framework [equivalent to Higher Diploma] 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.

UNITED STATES
IEEE is the world’s largest professional association advancing innovation and technological excellence. EIT is an IEEE Continuing Education Provider. IEEE Continuing Education Programs are peer-reviewed by content experts. This peer review guarantees both quality of the technical content of learning materials, as well as adherence to IEEE’s strict criteria for educational excellence. All programs that pass this strict process are entitled to award IEEE Continuing Education Units (CEUs), recognized as the standard of excellence for continuing education programs in IEEE’s fields of interest.

The International Society of Automation (ISA) is a leading, global, non-profit organization that sets the standard for automation around the world. ISA develops standards, certifies industry professionals, provides education and training, publishes books and technical articles, and hosts conferences and exhibitions for automation professionals. ISA has reviewed the curricula of the programs offered by EIT as they relate to the instrumentation, control and automation discipline and are enthusiastic about promoting their availability to the automation community.

UNITED KINGDOM
Nationally recognised qualifications that have been achieved at EIT can be compared by UK NARIC to the UK framework. UK NARIC is the UK’s national agency responsible for the recognition of qualifications from overseas and provides services for individuals and organizations to compare international qualifications against UK qualification framework levels. UK NARIC is managed by ECTIS Ltd [see http://www.ecctis.co.uk/naric/Default.aspx] which administers the service for the UK Government. Graduates of EIT’s Advanced Diploma programs in the UK can be confident that their international qualification has been officially evaluated as comparable to the BTEC/SAQ Higher National Diploma (HND) standard/Foundation Degree Standard. A BTEC Higher National Diploma is at the same level of the National Qualifications Framework as NVQ/SVQ Level 4. Recognition will be at a higher level for graduate programs.

The Institute of Measurement and Control in the United Kingdom is Britain’s foremost professional body for the Automation Industry. An EIT Advanced Diploma is recognized 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.

CANADA
EIT is a Participating Partner with the Engineering Institute of Canada [EIC] and EIT programs can be utilised by members to register for Continuing Education Units (CEUs). 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. EIC is a member of the International Association for Continuing Education and Training, with headquarters in Washington, DC.

OTHER COUNTRIES
Students who successfully complete an EIT Advanced Diploma and other qualifications may be able to apply for recognition of their qualification within the local (home country) education system. Many countries have a process for “recognition of foreign qualifications” which is utilised by new residents when they have qualifications earned overseas. Although you will be studying from your home country, you will be awarded an Australian qualification from the EIT, so your EIT qualifications may be able to be recognized as a “foreign qualification” if you apply through your local system. If you would like to find out more, please contact your local education authorities because it is not practical for the EIT to know the systems that apply in all countries. However, in many cases formal individual recognition within the home country may not be required because the international validity and accreditation of this credential is very sound.

Members of other engineering organizations may be able to claim credit for professional development and are advised to check with their own organization.

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

The program is composed of 21 modules, which cover 5 main threads, to provide you with maximum practical coverage in the field of Mechanical Engineering:

FUNDAMENTALS OF MECHANICAL ENGINEERING TECHNOLOGY
1. Fundamentals of Mechanical Engineering
2. Structural Mechanics
3. Mechanical Drive Systems
4. AC Electrical Motors and Drives
5. Rotating Equipment Balancing, Alignment and Condition Monitoring
6. Hydraulics
7. Pneumatics
8. Lubrication Engineering

APPLICATIONS OF MECHANICAL ENGINEERING TECHNOLOGY
9. Heating, Ventilation and Air-conditioning
10. Process Plant Layout and Piping Design
11. Pipeline Systems
12. Pumps and Compressors
13. Mechanical Seals
14. Safe Lifting
15. Machinery Safety

ENERGY SYSTEMS
16. Energy Efficiency
17. Renewable Energy Systems

INDUSTRIAL AUTOMATION
18. Industrial Automation
19. Measurement and Control Systems
20. Management of Hazardous Areas

MANAGEMENT
21. Project Management

For detailed information on the content and breakdown of modules, see pages 12 to 32

Presentation Format

The program 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 program 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 lecturers via phone, fax and e-mail.

Live Webinars

During the program you will participate in 72 live interactive sessions with the lecturer and other participants from around the world. Each webinar will last approximately 60 to 90 minutes, and we take student availability into consideration wherever possible before scheduling webinar times. Contact us for details of webinar session scheduling. All you need to participate is an adequate Internet connection, speakers and a microphone. The software package and setup details will be sent to you prior to the program.

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 Program

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.

Who Should Attend

- Plant operations and maintenance personnel
- Design engineers
- Process technicians, technologists and engineers
- Process control engineers and supervisors
- Mechanical technicians, technologists and engineers
- Mechanical equipment sales engineers
- Pump and mechanical equipment operators
- Contract and asset managers

To enrol please contact enquiries@eit.edu.au
Practical Exercises, Remote Labs and Assignments

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

As research shows, no matter how gifted and experienced an lecturer (and we believe ours are some of the best worldwide), no one learns from an lecturer only presenting program 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 lecturer that you are able to internalize 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 lecturers that we can achieve these goals and 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 lecturers to ensure the best outcome for students.

Benefits of Live E-learning

- Attend lessons in a live, virtual classroom with your lecturers 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 program lecturers and coordinator for the duration of the program
- 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 Mechanical Engineering Technology for CPD purposes

About the Engineering Institute of Technology (EIT)

The key objective of the Engineering Institute of Technology (EIT) is to provide an outstanding practical engineering and technology education, from Diplomas and beyond. The finest engineering lecturers and lecturers, with extensive real engineering experience in industry, are drawn from around the world. The learning is gained through synchronous, 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 program-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 Technologies. IDC has been operating for over 20 years, from offices throughout the world, delivering practical short programs to well over 500,000 engineers and technicians.

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

Why EIT?

- Our lecturers are selected and recruited from amongst the top engineers/lecturers 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 program prospectus, the programs 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 program 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 program accordingly.
- We have experience in training over 500,000 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 program.
- The program 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 program.

Program Fees

Your program fees include weekly webinars with leading engineering and technical experts, 30 technical eBooks, all program materials, software and postage, plus grading and support from the program coordinators and lecturers. We provide payment options and can accept fees in a variety of currencies. Please contact your advisor for fees in an appropriate currency for your location.
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 programs throughout the world.

1. Fundamentals of Mechanical Engineering
2. Practical Mechanical Drives (Belts, Chains and Gears) for Engineers and Technicians
3. Troubleshooting, Maintenance and Protection of AC Electrical Motors and Drives
4. Practical Balancing, Alignment and Condition Monitoring of Rotating Equipment
5. Practical Hydraulic Systems Operation and Troubleshooting
7. Practical Lubrication Engineering for Engineers and Technicians
8. Fundamentals of Process Plant Layout and Piping Design
9. Practical Pumps and Compressors Control, Operation, Maintenance and Troubleshooting
10. Practical Mechanical Seals - Selection, Maintenance
11. Practical Safe Lifting Practice and Maintenance
12. Practical Energy Efficiency, Design, Engineering and Auditing
13. Wind and Solar Power - Renewable Energy Technologies
14. Practical Hazardous Areas for Engineers and Technicians
15. Practical Project Management for Engineers and Technicians
16. Practical Troubleshooting & Problem Solving of Industrial Data Communications
17. Understanding Electrical Engineering and Safety for non-electricians
18. Practical Variable Speed Drives for Instrumentation and Control Systems
19. Programmable Logic Controllers (PLCs) And Scada Systems
20. Practical Troubleshooting of Data Acquisition & SCADA Systems
21. Practical Motion Control for Engineers and Technicians
22. Measurement and Control for Non-Instrument Personnel
23. Practical Process Control
24. RFID Tagging - Features and Applications
25. Practical SCADA Systems for Industry
26. Practical Control Valve Sizing, Selection and Maintenance
27. Practical Corrosion Management
28. Practical Financial Fundamentals & Project Investment Decision Making
29. Engineering Leadership - Making the Transition from Engineer to Leader
30. People Management Skills for Technical Professionals

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

For more information or to register, please contact enquiries@eit.edu.au

Entrance Requirements

This Engineering Institute of Technology advanced diploma is an accelerated, practical, work-oriented program. 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 enrollment application and may recommend pre-program studies if required.

Advanced Diploma Preparation Program

If you are unsure if you have a strong enough grasp of the fundamental knowledge required for this program, or you simply want to refresh your skills and experience e-learning in a shorter program, we recommend that you consider the EIT’s engineering studies preparation program. This intensive 4-month program 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 program.

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

Hardware and Software Requirements

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

We are Flexible with your Commitments

We recognise that personal circumstances can make it difficult to complete the program in the time available. We will be flexible about the time you require to complete the program. 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 start date to complete the program.

You can withdraw from the program 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 Mechanical Engineering Technology.
What Our Students Have to Say

QUOTES FROM PAST STUDENTS on the EIT SURVEY ON E-LEARNING to the following question:

What made you choose an EIT program(s)?

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

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

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

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

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

“I can do those programs 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 programs.” Kacst, Saudi Arabia

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

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

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

“Had completed programs 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 programs 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 program that I am currently enrolled in also had all the outcomes I was looking for to further my career.” Rio Tinto

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

“I have done a few IDC programs 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 program delivery including its quality support structures.” OneSteel

“Program 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

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

“Convenience.” Rio Tinto

“To be perfectly honest with the small amount of research on various programs I did the programs 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

“Program 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

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

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

“Their programs are standard and program material as well as lecture are okay.” Shell, UK

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

“The most practical and technical offerings by the most qualified lecturers 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 lecturer and class instead of working totally on my own.” Mitchell Technical Institute

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

“Offer the correct program, 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 program 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. Program 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 program materials are provided by us.

Doesn’t it get boring? How can an e-Learning program 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 lecturer and other participants from around the world in an online ‘virtual classroom’ where you are able to watch a presentation, and communicate with the lecturer 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 program 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 program 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 program in less time?

Our programs 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 program successfully. See also ‘What if I cannot join or I miss a live webinar?’ In addition, accelerating the program would be quite onerous for most students.

How much time do I need? How long is the program?

The program reading and assignments may consume anywhere from 5 to 10 hours per week. This will vary depending on the program 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 program is delivered over an intensive 18 months. We do break for about 4 weeks per year for traditional festive seasons.
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 program.

GUEST SPEAKER
Richard E. Morley

Richard E. Morley, best known as the father of the Programmable Logic Controller (PLC), is a leading visionary in the field of advanced technological developments. Mr. Morley (Dick) is a member on the Board of Directors of various companies across the United States and has worked in high tech industries since the beginning of solid-state electronics.

He is currently Chairman of the Board of NCMS (National Center for Manufacturing Sciences) and has a proven track record in the founding of successful high-tech companies for where he provides initial product concept and a continuing technological presence. He is a nationally recognized expert in the field of computer design, artificial intelligence, automation and is an authority on the factory of the future. Mr. Morley is an engineer, consultant and inventor. His inventions include the PLC (Programmable Logic Controller), which now stands in the Smithsonian Institute. He holds more than twenty United States and foreign patents.

Mr. Morley is well known as a lecturer, has written extensively for such publications as Manufacturing Systems magazine and Manufacturing Automation magazine. He has published many works of his own. His latest book, 'Out of the Barn', was published in October 2002 and another book, 'The Technology Machine', was published in September 1999. Mr Morley founded the angel investment group, the Breakfast Club. He is currently an active member with this group of investors having participated in more than 100 startup companies in the New Hampshire area. He was the former Director of Advanced Technologies for Gould, Inc. He is a Gould Fellow of Science and Engineering, a Fellow of SME, Bios LP and ICS.

In addition, he was awarded the 1990 Entrepreneur of the Year by Inc. magazine, Merrill Lynch and Ernst and Young. He is a 1991 recipient of The Franklin Institute’s Howard N. Potts Medal, and holds the Prometheus Medal placing him into the Automation Hall of Fame. International IEN ranked him 3rd in the “Top 100 Most Significant Industrial Products of the 20th Century” for his work with the PLC. In October 1999, ISA (Instrumentation, Systems and Automation Society) honored him with the “Life Achievement Award” and Fortune magazine awarded him their “Heroes of Manufacturing Award” in March 2000.

Recognised as one of the giants in the field by the Engineering Society of Detroit, he has extensive experience in high-tech consulting and is involved in new product development at the highest management levels. Currently he works out of his barn in New Hampshire where he and his wife have been home to more than two dozen foster children.

ACADEMIC CONSULTANT
Steve Mackay  PhD, BSc(Elec.Eng), BSc(Hons), MBA, MMR, CP Eng, FIE(Aust) - 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 programs 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. He is currently leading a team of two design engineers and four programmers in creating a new video conferencing software package with remote labs which he believes will make a marked impact on engineering training and education.

LECTURER
Professor Cornie Scheffer  BEng(Mech) MEng PhD SAIMechE

Cornie is an engineer who combines a deep understanding of the theoretical aspects of mechanical engineering with a passion for the practical applications of the technology. He is currently Associate Professor at a world renowned university and is responsible for numerous consulting and research projects that are done in close collaboration with industry, with a special focus on mechanical design and mechatronic systems throughout the world. He has designed and commissioned numerous mechanical products and automation systems for industry.

Cornie is also an experienced lecturer on a wide range of topics within mechanical engineering, including mechanical design, maintenance, mechanical vibrations, structural mechanics and mechatronics. Through the years he has prepared and presented workshops on these topics to over 1,000 engineers and technicians worldwide, including the USA, Europe, Australia, South Africa and the Middle East. He is also the author and co-author of numerous technical papers, published locally and internationally. His book on Predictive Maintenance has just been released to the largest technical publisher in the world - Elsevier.

Cornie presently consults to a wide variety of industries and is a passionate teacher that follows a hands-on approach in his presentations. His enthusiasm and down-to-earth manner makes for an enjoyable and instructive program.
International Expert Speaker Faculty

LECTURER

Dr. Rodney Jacobs  NH Dip, M Dip Tech, BA (Hons), D Tech  Senior Instrumentation Engineer

Rodney has over 20 years of experience in the gold mining industry, underground as well as specialising in Metallurgical operations in mining. He has worked predominantly 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.

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. Finally, Rodney has presented numerous IDC workshops in the United States, England, Ireland, Scotland, Bahrain, United Arab Emirates, Iran, South Africa, Australia, New Zealand and Malaysia.

LECTURER

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 lecturer and his programs are extremely interesting with many ideas, anecdotes and tips drawn from his rich experience.

LECTURER

Robert Snaith  HND (Mech.Eng)

With over 30 years of experience in fluid transport systems, Rob has done the hard yards. Commencing work immediately in fluid system applications engineering after graduating, he expanded his focus in later years to the plant management of the manufacture of fluid sealing and transport equipment. In the past decade as a private consultant, he has worked extensively in designing and troubleshooting complex fluid transport systems and equipment.

When not working long hours on the design, commissioning and troubleshooting of pumps and pipelines, Rob squeezes some time in for his Harley Davidson motorbike and scuba diving expeditions. He has done many presentations and workshops throughout the world and was placed third in the world in an international pumps, ‘Train the Trainer’ workshop in Boston, Massachusetts in 1998. One of his passions and sources of enjoyment is in instructing technical programs. No matter whether you have very little knowledge or are a veritable guru; you will be sure to take away useful knowledge from his programs, which you can immediately apply to your business.
International Expert Speaker Faculty

LECTURER

Tom Simko  PhD, MIEAust, CPEng, PEng

Tom has ten years of experience with HVAC and fenestration (windows). His ongoing research concerns the thermal processes in vacuum glazing, which is used in highly insulating windows. He was a representative from the University of Sydney vacuum glazing group on the International Energy Agency Solar Heating and Cooling Program, Task 18. He has also spent six years working on and advising solar-electric vehicle projects.

For the past three years, Tom has taught HVAC at the University of Toronto to graduate and continuing education students.

Tom has received nine university teaching awards. He ensures that concepts are thoroughly explained not only with theory but also with practical common sense and real-life examples so students truly understand them.

Tom also writes technology features about solar cars and aerospace for major newspapers in Australia, Asia and Canada [links at www.energy-innovations.ca/Articles.htm]. He is passionate about explaining complex science and engineering topics in plain language and describing the practical benefits of technology.

LECTURER

Tristan Holland  B.Eng (Chem), M EngSc (Advanced Process)

Tristan has been working within the Australian water industry for the past 13 years after graduating with his engineering degree. His engineering experiences have taken him from the humble port of Adelaide to all areas of Australia and around the world including Africa, PNG, India and Canada. Tristan started off in commissioning and operations of water and wastewater treatment facilities, and then moved to designing, construction and commissioning.

Over the years the technology that Tristan has been involved with has been as varied as his engineering experiences, including pipework design for water treatment, air pollution treatment systems, and wastewater treatment systems in remote challenging environments. Two years ago Tristan decided to expand his qualifications and started a Masters of Advanced Process Design, providing an advanced ability to adapt other engineering technologies to water and wastewater treatment systems.

By bringing together his technical knowledge, understanding of theoretical processes and practical based engineering background, you will leave this program with practical ideas and applications that can be implemented into existing systems.

LECTURER

Deepak Pais  B.E (Electrical & Electronics)

Deepak started his career within the Zinc mining and smelting industry as Project Engineer in Substation and Distribution Greenfield project. He then worked in a Marine and Logistics firm in the Bahamas as Maintenance and Commissioning Engineer. Following this he worked with Japanese and German automobile firms as Maintenance Engineer for Distribution and Utility related systems. He currently works as an Engineer in a regional NSW electricity Distribution utility.

Deepak has hands on experience in Distribution, Utility and Substation related systems. He has a particular interest in the consistent interpretation and implementation of Greenfield and Brownfield Standards with an emphasis on safety, reliability, economy and whole of life cost analysis.

LECTURER

Tom Neillings  Dip EE, Dip Bus Mngmt

Tom started his career as an engine fitter in the RAF. After leaving the RAF Tom worked in oil and gas North Sea projects. During this period he gained valuable experience and knowledge of diesel power generating systems operating in harsh environments. Tom continued his career in South Africa with a short period in Saudi Arabia.

Tom’s down-to-earth and practical, yet entertaining approach makes him a sought after speaker and instructor. His enthusiastic approach to training coupled with his helpful nature is guaranteed to maximise the learning outcome for his students.
Module 1: Fundamentals of Mechanical Engineering

You Will Learn How To:
- Apply basic concepts in Mechanical Engineering
- Describe concepts related to engineering materials
- Examine and discuss concepts and technologies related to mechanical design
- Identify the different manufacturing processes for mechanical components

Overview
This module introduces the fundamental concepts and applications of Mechanical Engineering. It starts with an introduction to the principles of mechanical drawings such as tolerances, symbols, sections and CAD, followed by a discussion on the mechanical behavior of engineering materials, e.g. stress and strain, fatigue, fracture, creep and corrosion. Practical fundamentals of mechanical design and manufacturing methods are also addressed.

Practical Sessions and Exercises
Calculations and simple design exercises relating to:
- Strength of materials
- Structural analysis
- Design philosophies

THE PROGRAM

TOPIC 1.1
BASICS AND MATERIALS
MECHANICAL ENGINEERING BASICS
- Interpretation of mechanical drawings
- Friction
- Limits and fits
ENGINEERING MATERIALS
- Tension and compression
- Stress and strain
- Basic properties of engineering materials
- Common failure of modes of materials

TOPIC 1.2
DESIGN AND MANUFACTURING
MECHANICAL DESIGN
- Basic principles
- Factor of Safety (FoS)
- Static equilibrium
- Threaded fasteners
- Keys and keyways
- Riveted joints
- Design for static strength
- Design for fatigue strength
MANUFACTURING
- Casting
- Heat treatment
- Hot and cold working of metal
- Press work and tooling
- Machining and metal cutting
- Shaping, sawing, broaching
- Welding, brazing
- CAM and CNC
- Rapid prototyping
You Will Learn How To:

- Examine and apply the basic principles of strength of materials
- Explain the basics of structural analysis
- Examine and discuss structural design philosophies

Overview

Construction is the largest industry in the world and anything constructed needs to be designed first. Structural Engineering deals with the analysis and design aspects, the basic purpose of which is to ensure a safe, functional and economical structure. While designing, the designer constantly interacts with specialists such as architects and operations managers. Once the design is finalized, the implementation requires involvement of people to handle aspects such as statutory approvals, planning, quality assurance and material procurement. The entire exercise can be undertaken in a highly-coordinated way if everyone involved understands the ‘project language’, which is a combination of designs and specifications. To understand the language fully, it is necessary to appreciate the principles of structural analysis and design.

THE PROGRAM

TOPIC 2.1 PRINCIPLES OF STRENGTH OF MATERIALS
- Theory of elasticity
- Stress-strain characteristics
- Sectional properties
- Deflection and deformation

TOPIC 2.2 STRUCTURAL ANALYSIS
- Principle of mechanics
- Determinate and indeterminate structures
- Determination of stress functions (direct, bending and shear)
- Analysis of statically determinate structures
- Analysis of statically indeterminate structures
- Analysis of deformation under loading

TOPIC 2.3 DESIGN PHILOSOPHIES
- Material behavior under stress
- Working stress design
- Limit state design
- Loads

Practical Sessions and Exercises

Calculations and simple design exercises relating to:
- Strength of materials
- Structural analysis
- Design philosophies
Module 3: Mechanical Drive Systems

You Will Learn How To:
- Examine and discuss the concept of prime movers
- Select appropriate bearings for given applications
- Select appropriate chains for given applications
- Select appropriate belts for given applications
- Select appropriate gear drive systems for given applications
- Select appropriate couplings for given applications
- Select appropriate clutches and brakes for given applications

Overview
Most engineering professionals working with drives will confirm that there are major benefits in installing and maintaining mechanical drives correctly the first time. Typical areas that can be dramatically improved include: wear and tear on equipment, unscheduled downtime and production losses, energy consumption, operating efficiencies.

This module has been designed to examine the majority of mechanical drives such as belts, chains and gears in terms of improved lubrication, proper alignment, and fastening techniques. You will have an opportunity to discuss drive design applications, operations, maintenance and management issues and you will be provided with the most up-to-date information and best practice in dealing with the subject. You will develop the skills and ability to recognize and solve drive problems in a structured and confident manner.

Practical Sessions and Exercises
Calculations and simple design exercises relating to:
- Bearings
- Chains and belts
- Gear drive systems
- Belts
- Couplings
- Clutches and brakes

THE PROGRAM

TOPIC 3.1 PRIME MOVERS
- General types
- AC synchronous motors
- Induction motors
- Operating characteristics
- Selection considerations

TOPIC 3.2 BEARINGS
- Types, construction and materials
- Bearing loads
- Numbering systems
- Installation and removal
- Bearing clearance and pre-loading
- Bearing failure and life expectancy
- Bearing material
- Troubleshooting

TOPIC 3.3 CHAINS AND BELTS
- Principles of operation
- Precision roller chain
- Sprocket selection
- Silent chain
- Engineering chains
- Chain lubrication
- V-belt, flat belt and synchronous/timing belts
- Miscellaneous belts
- Determining proper tension

TOPIC 3.4 GEAR DRIVE SYSTEMS
- Open and closed systems
- Parallel, concentric and right angle configurations
- Load factors and selection
- Service factoring
- Installation, troubleshooting and maintenance
- Angular errors, backlash adjustment and alignment
- Lubrication
- Gear materials

TOPIC 3.5 COUPLINGS, CLUTCHES AND BRAKES
- Rigid and flexible couplings
- Universal joints
- Load factors
- Chain couplings
- Hydraulic couplings

- Hydraulic couplings

- Mechanical, friction, centrifugal and plate clutches
- Clutch selection
- Torque converters
- Mechanical, hydraulic, pneumatic and electric brakes
Module 4: AC Electrical Motors and Drives

You Will Learn How To:

- Explain how torque is produced in an electrical motor
- Examine the basic principles, construction, starting and speed control of AC motors
- Select AC motors for a given application and troubleshoot motor problems
- Explain the principle and selection of variable speed drives for AC motors

Overview

Electrical motors are one of the most important components in any type of industry. Whatever the type of mechanism, be that mechanical, pneumatic or hydraulic, the energy to drive them is mostly derived through a motor. A motor is nothing but a converter of electrical energy to mechanical energy with a rotational output. In this module you will be given an understanding of the basic principles involved in producing a driving torque using motors, and of the various types of motors used in industry. You will learn about an induction motor which is often called ‘the workhorse of industry’, its constructional details, and how to select a motor appropriate to your needs. Oftentimes the driven equipment requires to be reversed and the speed needs to be varied. This module will discuss the operation of motors such as staring, reversing and speed control.

A motor has a large mechanical component in its design and failures are mostly because of wrong application, improper maintenance of mechanical parts, and problems with the driven equipment. This module will provide an insight into the maintenance aspects of motors and how to avoid motor failures. The failure of a single motor can cause an entire production line to stop and the consequential losses can be way too high compared to the cost of repairing the motor itself. Therefore all efforts must be made to maintain the motors properly and avoid failures.

Electronic speed control using Variable Frequency Drives is a method commonly adopted to control the speed of AC motors. This module will discuss the basic principle of variable frequency method of speed control, applications of such control in the industry, and how to match the drive with the driven equipment.

Practical Sessions and Exercises

Calculations and simple design exercises relating to:

- AC motor selection for different applications
- Speed control of AC motors
- Identification of reason for motor failures
- Selection of a drive in a given application

Case study on motor failures and analysis

THE PROGRAM

**TOPIC 4.1**

**FUNDAMENTALS OF ELECTRIC MOTORS**

**PRODUCTION OF TORQUE IN ELECTRIC MOTORS**
- Relationship between magnetism, electric current and force
- Motor parameters: torque, inertia, efficiency, and power
- How electric motors produce torque
- Types of motors and their suitability in different applications

**CONSTRUCTION AND CONTROL OF AC MOTORS**
- Important components of motors
- Relation between supply frequency, number of poles and speed of AC motors
- Reversal of direction of 3-phase AC motors and the basic principles involved
- Efficiency of AC motors and the types of losses involved

**TOPIC 4.2**

**MOTOR SELECTION, TROUBLESHOOTING AND SPEED CONTROL**

**AC MOTOR SELECTION AND TROUBLESHOOTING**
- Motor induction torque/speed curves
- Important points to be considered for motor selection
- Motor problem areas and maintenance needs
- Identification of probable causes for motor failure

**PRINCIPLE AND SELECTION OF VARIABLE SPEED DRIVES FOR AC MOTORS**
- The need for speed control and the control approach used in AC machines
- The principle of a variable frequency drive for AC motors
- Torque/speed/power curves of a typical VSD
- Criteria for selecting a VSD for a given application
Module 5: Rotating Equipment Balancing, Alignment and Condition Monitoring

You Will Learn How To:
- Examine and discuss the technical and financial implications of maintenance or the lack thereof
- Examine and discuss the basics of mechanical vibration
- Examine and discuss vibration measurement
- Examine and discuss balancing
- Examine and discuss alignment
- Examine and discuss condition monitoring tasks

Overview
You will have an opportunity to discuss precision maintenance for rotating machinery and associated applications, operations, maintenance and management issues. The focus will be on the most up-to-date information and best practice. Towards the end of this module you will have developed the basic skills and ability to recognize and solve precision maintenance issues in a structured and confident manner in working towards improving the reliability and performance of rotating machinery.

After an introduction to the application of maintenance and costs of breakdowns, the important issue of vibration and vibration measurement is detailed. The important topic of balancing is then discussed, drawing on practical examples. Misalignment and other machinery faults are then covered. Other often-neglected areas of particle and chemical analysis, temperature monitoring and failure analysis are covered in simple, but practical detail.

Practical Sessions and Exercises
Calculations and simple design exercises relating to:
- Mechanical vibration
- Vibration measurement
- Balancing
- Alignment
- Condition monitoring tasks

Case study on setting up a simple precision maintenance program.

THE PROGRAM

TOPIC 5.1
INTRODUCTION
- The mission of maintenance
- Maintenance philosophies
- Cost of breakdowns
- The role of precision maintenance

TOPIC 5.2
MECHANICAL VIBRATION BASICS
- What is vibration?
- Vibration waves
- Overall vibration
- Vibration spectrum
- Natural and forcing frequencies

TOPIC 5.3
VIBRATION MEASUREMENT
- Vibration sensors
- Selection of sensors
- Sensor specifications
- Sensor mounting
- Spectrum analyzers and other instrumentation

TOPIC 5.4
BALANCING
- Identifying unbalance
- Practical aspects
- Definitions
- Single-plane and two-plane balancing
- Four-run method
- Overhung rotor
- Balancing standards

TOPIC 5.5
ALIGNMENT
- Identifying and measuring misalignment
- Rough methods
- Reverse dial method
- Face-rim method
- Laser alignment
- Alignment tolerances

TOPIC 5.6
CONDITION MONITORING TASKS
- Tighten, Lubricate, Clean (TLC)
- Chemical and particle analysis
- Ultrasonic inspection
- Temperature monitoring
- Performance monitoring
- Failure analysis
Module 6: Hydraulics

You Will Learn How To:

- Examine and discuss the basics of pressure and flow
- Describe the classification and construction of hydraulic cylinders
- Describe the classification and actuation of control valves
- Describe the classification and operation of pressure control valves
- Examine the different types of electro-hydraulic systems

Overview

Whatever your hydraulic applications, you can increase your knowledge of the fundamentals, improve your maintenance programs, and become an excellent troubleshooter of problems in this area by attending this information-packed module. Understanding ‘how’ hydraulic components work leads to an understanding of how and why it fails. Towards the end of the module, you will have developed the skills and ability to recognize and solve hydraulic problems in a structured and confident manner.

THE PROGRAM

TOPIC 6.1
PRESSURE, FLOW AND HYDRAULIC CYLINDERS

PRESSURE AND FLOW
- Definition and units of pressure measurement
- Pascal’s law and applications
- Pressure/force relationship
- Fluid flow/discharge
- Steady and unsteady flows
- Bernoulli’s principle
- Laminar and turbulent flows
- Pressure/flow relationship

HYDRAULIC CYLINDERS
- Classification (single vs. double acting)
- Cylinder construction and mounting
- Seals
- Cylinder design checklist
- Common cylinder problems

TOPIC 6.2
CONTROL VALVES
- Purpose
- Classification
- Valve symbols
- Poppet valve
- Check valve
- Spool valve
- Directly and indirectly operated valves
- Valve actuation methods
- 2, 3 and 4-way direction control valves
- Positive and negative overlapping
- Center conditions

TOPIC 6.3
PRESSURE CONTROL VALVES
- Relief valve
- Surge pressure
- Sequence valves
- Counterbalance valves
- Pressure reducing valves
- Unloading valves

TOPIC 6.4
ELECTRO-HYDRAULIC SYSTEMS
- Proportional solenoid
- Proportional valve
- Servo valve
- Use of transducers in hydraulic systems

Practical Sessions and Exercises

Practical exercises relating to:
- Pressure and flow
- Hydraulic cylinders
- Control valves
- Pressure control valves
- Flow control valves
- Electrohydraulic systems

Case study on designing a hydraulic system.
Module 7: Pneumatics

You Will Learn How To:

• Examine and discuss the basics of air preparation
• Identify pneumatic elements and symbols
• Design and troubleshoot pneumatic systems

Overview

Whatever your pneumatic applications, you can increase your knowledge of the fundamentals, improve your maintenance programs, and become an excellent troubleshooter of problems in this area by attending this module. Developing an understanding of 'how' components work leads to an understanding of how and why they fail. You will have an opportunity to discuss pneumatic systems construction, design, applications, operations, maintenance and management issues. You will also be provided with the most up-to-date information and best practice in dealing with the subject. Towards the end of the module, you will have developed the skills and ability to recognize and solve simple pneumatic problems in a structured and confident manner.

Practical Sessions and Exercises

Exercises relating to:

• Air preparation
• Symbols
• Pneumatic elements
• Basic circuit design
• Troubleshooting pneumatic circuits

Case study on designing a pneumatic system.

THE PROGRAM

TOPIC 7.1
AIR PREPARATION, PNEUMATIC SYMBOLS AND PNEUMATIC ELEMENTS

AIR PREPARATION
• Characteristics of air
• Air generation and distribution
• Characteristics of pneumatic systems

PNEUMATIC SYMBOLS AND ELEMENTS
• Symbols for pneumatics
• Components of pneumatic systems
• Actuator and output devices
• Cylinders
• Control valves
• Non-return valves
• Pressure valves

TOPIC 7.2
PNEUMATIC CIRCUIT DESIGN AND MAINTENANCE

• Pneumatic circuit design
• Troubleshooting: flow chart analysis of pneumatic circuits
• Maintenance of pneumatic systems
Module 8: Lubrication Engineering

You Will Learn How To:

• Examine and discuss the basics of Tribology
• Describe the properties of lubricants
• Examine and discuss the characteristics and application of additives
• Examine the root causes of lubricant failure
• Examine and discuss issues related to lubricant storage

Overview

With a bewildering selection of thousands of lubricant types, base stocks, additive packages and viscosity grades to choose, how do you know which one is right for your machine? After attending these sessions and, interacting with your fellow students and lecturer, you will have the tools and knowledge to understand the key properties of lubricants and how to select the right one for your applications.

Modern lubrication programs have dramatically changed from the old methods that have been passed down through the generations. If you aren’t using the right lubricant at the right time, in the right place, and in the right quantity, you could be doing more harm than good and costing your company thousands of dollars.

This module collates the strategic knowledge of many practising professionals in this area and gives you the best practice to work with. You will have an opportunity to discuss lubricant management, design applications, operations, maintenance and management issues and be provided with the most up-to-date information and best practice in dealing with the subject.

THE PROGRAM

TOPIC 8.1
TRIBOLOGY
• Cause and effects of friction
• Fluid and hydro-dynamic lubrication
• Boundary lubrication
• Lubricant characteristics under varying conditions
• Lubricant types and applications

TOPIC 8.2
PROPERTIES AND ADDITIVES

PROPERTIES OF LUBRICANTS
• Viscosity
• Flashpoint and volatility
• Oxidation and thermal stability
• Demulsibility
• Foaming and gas solubility
• Corrosion prevention
• Compatibility

ADDITIVES
• Oxidation inhibitors
• Rust and corrosion inhibitors
• Pour point depressants
• Viscosity Inhibitor (VI) improvers
• Anti-wear additives
• Extreme Pressure (EP) additives
• Anti-foam additives
• Detergents and dispersants additives
• Demulsifiers and emulsifiers
• Tackiness additives

TOPIC 8.3
STABILITY AND STORAGE ISSUES

ROOT CAUSES OF FAILURES
• Fluid contamination
• Leakage stability
• Fluid chemical stability
• Temperature stability
• Wear stability

STORAGE
• Safety issues
• Shelf life
• Contamination potential

Practical Sessions and Exercises

Practical exercises relating to:

• Tribology
• Properties of lubricants
• Additives
• Root causes of failures
• Storage

Overall case study on designing a complete working lubricant management program.
Module 9: Heating, Ventilation and Air Conditioning

You Will Learn How To:

- Examine and discuss basic concepts in HVAC
- Interpret and utilize a psychrometric chart
- Recognize the impact of design conditions on HVAC systems
- Perform cooling load calculations
- Examine and discuss Indoor Air Quality
- Describe the design and operation of HVAC systems

Overview

This module is designed for engineers and technicians from a wide range of abilities and backgrounds and will provide an excellent introduction to the fundamentals of Heating, Ventilating and Air Conditioning. It commences with a review of psychrometric charts and then examines the factors that influence design choices, indoor air quality, load calculations and heating/ventilation and airconditioning systems. Numerous tips and tricks throughout the module make it very practical and topical to your applications.

Practical Sessions and Exercises

Use simple HVAC software design programs to illustrate the key principles in the program and undertake several practical exercises relating to:

- Psychrometric charts
- Design conditions
- Heat load calculations
- Indoor air quality

Undertake an overall case study on designing a complete working HVAC system.

THE PROGRAM

TOPIC 9.1
INTRODUCTION AND PSYCHROMETRIC CHARTS
INTRODUCTION TO HVAC
- Properties of solids, gases and water
- Force, work, power, energy calculations
- Heat and temperature
- Change of phase
- Pressure
- Density, specific volume, and mass flow

PSYCHROMETRIC CHART
- Development of the psychrometric chart
- Physical and thermodynamic properties of air
- Measurement of wet and dry bulb temperature of air
- Calculations

TOPIC 9.2
DESIGN CONDITIONS AND CALCULATIONS
DESIGN CONDITIONS
- Outdoor climate considerations
- Indoor comfort considerations

COOLING LOAD CALCULATIONS
- Heat flow through structures
- Infiltration and exfiltration
- Solar heat gains
- External heat gains

TOPIC 9.3
INDOOR AIR QUALITY
- Central air conditioning systems
- IAQ definition
- Effects on occupants
- Basic investigation techniques
- Architectural, engineering and interior design choices for good IAQ

TOPIC 9.4
HVAC SYSTEMS
- System design
- System operation
- All-air systems
- All-water systems
- Air-water systems
- Heat pumps
Module 10: Process Plant Layout and Piping Design

You Will Learn How To:

- Examine and discuss the basics of process plant layout and design
- Describe the basic attributes of equipment used in process plants
- Examine and discuss the basics of plant layout and plot plans
- Examine and discuss the basics of Process and Instrumentation Diagrams
- Create plant layout and piping design documentation

Overview

Process plants such as refineries and petrochemical plants are complex facilities consisting of equipment, piping systems, instruments, electrical systems, electronics, computers, and control systems. The design, engineering and construction of process plants involve multidisciplinary team effort. Plant layout and design of piping systems constitute a major part of the design and engineering effort. The objective is to design safe and dependable processing facilities in a cost effective manner. The fact is that there are few formal training programs with a focus on plant layout and design of piping systems, therefore most of the required skills are acquired while on the job, reducing productivity and efficiency.

This interactive module will cover the fundamental principles and concepts used in process plant layout and piping design. You will have an opportunity to learn and discuss the techniques and procedures used in the design and engineering of complex process plants, including fundamentals of plant layout, the equipment used, design principles and procedures. Practical examples from actual projects will be used extensively to illustrate the principles and drive home the point.

THE PROGRAM

TOPIC 10.1
INTRODUCTION TO PROCESS PLANT LAYOUT AND PIPING DESIGN

FUNDAMENTALS
- Plant layout fundamentals
- Procedures and workflow methods
- Physical quantities and units
- Process Flow Diagrams (PFDs)

EQUIPMENT USED IN PROCESS PLANTS
- Process equipment
- Mechanical equipment
- Equipment drawings and specifications
- Equipment foundations and supports

TOPIC 10.2
PLANS, DRAWINGS AND DIAGRAMS

PLANT LAYOUT AND PLOT PLANS
- Plant layout specifications
- Guidelines and codes for plant layout
- Safety considerations
- Plot plans
- Equipment arrangement drawings

PROCESS AND INSTRUMENTATION DIAGRAMS (P&IDs)
- Fundamentals of P&IDs
- Instruments and instrument symbols
- Layout and components of control valve manifolds
- Layout and components of meter runs

TOPIC 10.3
PLANT LAYOUT AND PIPING DESIGN DOCUMENTATION AND TOOLS
- Equipment arrangement drawings
- Equipment lists
- Piping line lists
- Piping specifications and codes
- Piping isometrics
- Bills of Material
- 3D models

Practical Sessions

Practical assignment consisting of questions on the following topics:
- Equipment used in process plants
- Plant layout and plot plans
- PFDs and P&IDs
- Plant layout and piping design documentation and tools

The assignment will involve application of concepts used in designing process plants and will generate sample documents and drawings.
Module 11: Pipeline Systems

You Will Learn How To:

- Discuss pipeline design standards
- Examine and discuss routing techniques and environmental considerations
- Examine and discuss the components and materials used in pipelines
- Discuss corrosion prevention, assessment and repair

Overview

This module covers the practical aspects of pipeline design, integrity and maintenance. Applicable codes and standards will be discussed, as will be the issues of mechanical and hydraulic design and construction practices. The optimum routing and layout techniques will also be assessed. The focus is mainly on a land based environment and will teach you to use key performance indicators to measure the performance of a pipeline system. Use will be made of case studies and practical exercises to ensure the material is covered thoroughly.

The Program

TOPIC 11.1 STANDARDS, ROUTING AND ENVIRONMENTAL ISSUES

PIPELINE DESIGN STANDARDS

- Standards development
- International and local codes applicable to pipelines
- Changes to regulations
- Pipeline design steps
- Fluids and gases transported

ROUTING TECHNIQUES AND ENVIRONMENTAL CONSIDERATIONS

- Investigation of pipeline routing techniques
- Environmental issues to consider during planning
- Design considerations with respect to the environment

TOPIC 11.2 DESIGN CONSIDERATIONS AND CORROSION

PIPEDLINE DESIGN: COMPONENTS AND MATERIALS

- Pumps and compressors
- Optimal pipe size vs. location of pump/compressor stations
- Optimal pipeline construction material

CORROSION, ASSESSMENT AND REPAIRS

- Practical corrosion
- Classification of corrosion mechanisms
- Internal corrosion: chemical treatments, inhibitors and biocides
- External corrosion: Coatings and cathodic protection

Practical Sessions and Exercises

Practical exercises and case studies to reinforce the concepts discussed, specifically on:

- Routing techniques
- Pipeline design considerations
- Effectiveness of cathodic protection
You Will Learn How To:

- Outline pump and compressor attributes
- Examine and discuss the construction of centrifugal pumps
- Describe the characteristics and operation of pumps
- Discuss methods for appropriate pump selection
- Examine and discuss pump control, commissioning and performance measurement
- Examine and discuss the construction and operation of reciprocating compressors
- Examine and discuss the construction and operation of centrifugal compressors

Overview

This module focuses on the fundamentals. You will have an opportunity to discuss pump/compressor construction, design applications, operations, maintenance and management issues and be provided with the most up-to-date information and best practice in dealing with the subject. You will develop the skills and ability to recognize and solve simple pump/compressor problems in a structured and confident manner.

Practical Sessions and Exercises

Practical exercises relating to:
- Centrifugal pumps
- Pump characteristics
- Pump specification and selection
- Compressors
- Reciprocating compressors
- Centrifugal compressors

Case study on designing a complete pump and compressor system
Module 13: Mechanical Seals

You Will Learn How To:

- Examine and discuss the basic principles of seals
- Examine and discuss seal design and classification
- Discuss the properties of seal materials
- Outline the proper procedures for seal handling and installation
- Examine and discuss the issue of seal failure
- Select appropriate seals for given applications
- Describe methods to maximize seal life

Overview

Whether you consider yourself as amateur or knowledgeable, practical or theoretical, you will find that this module is jam-packed with useful, easy-to-apply information. Faced with the bewildering task of selecting the correct seal type and materials of construction for a given application, it’s no wonder that many end-users leave the job to others. After attending these sessions, you will have the knowledge and confidence to select correct seal types, analyze failed seals, determine the cause/s of failure and propose practical, and take remedial action. Learn how, with simple modifications, you can extend seal life and reduce or eliminate causes of premature seal failure.

The module commences with a solid review of the fundamentals and basic principles, and looks at seal classification and design. Special seal types are examined and the materials used to construct seals ranging from elastomeric materials to cemented carbides are examined.

Practical Sessions and Exercises

Practical exercises relating to:
- Seal design and classification
- Seal materials
- Handling and installation
- Seal failure
- Seal selection
- Maximising seal life

Overall case study on selecting seals and maximizing seal life

THE PROGRAM

TOPIC 13.1
SEALS PART I

BASIC PRINCIPLES
- Definition of zero leakage
- Mechanics of sealing
- Purpose of sealing
- Basics regarding speed and pressure
- Basic seal requirements
- Seal friction
- Wear and seal life
- Seal balance criterion
- Seal applications
- Operating capabilities, advantages and limitations

SEAL DESIGN AND CLASSIFICATION
- Identifying seal components and their function
- Identifying primary sealing components
- Secondary sealing components
- Inside and outside seals
- Static and dynamic seals
- Seal pre-loading

SEAL MATERIALS
- General considerations
- Properties of elastomers
- Carbides
- Miscellaneous sealing materials
- Material compatibility

TOPIC 13.2
SEALS PART II

HANDLING AND INSTALLATION
- General considerations
- Seal face squareness
- Centering seal faces

SEAL FAILURES
- Factors influencing seal life
- Factors affecting seal performance
- Seal malfunction and probable causes
- Friction and wear
- Corrosion

SEAL SELECTION
- Seal selection guides

HOW TO MAXIMIZE SEAL LIFE
- Preparing the pump - mechanically, hydraulically
- Controlling temperature in the stuffing box
- Controlling pressure in the stuffing box
- Choice of seal
- Face combination and elastomer
Module 14: Safe Lifting

You Will Learn How To:

- Examine and discuss the basic principles of safe lifting practice
- Examine and discuss the regulations pertaining to lifting
- Examine and discuss the establishment of load characteristics
- Examine and discuss lifting tackle
- Examine and discuss lifting machines
- Examine and discuss the fundamentals of chain slings
- Examine and discuss the fundamentals of steel wire rope slings
- Examine and discuss the fundamentals of textile slings

Overview

Lifting equipment refers to both the lifting tackle and the lifting machines. It should be emphasized that all loads are dangerous, as a 50 kg load will kill or maim as surely as a 5 ton load if dropped from a one meter distance. Safety is not negotiable, therefore this module drives home the point that if you use correct lifting equipment correctly and safely, and your operators and personnel are well-trained and in compliance with local legislation as well as with a Total Safe Lifting program, you will have a productive work force.

THE PROGRAM

TOPIC 14.1
SAFE LIFTING I
FUNDAMENTAL PRINCIPLES OF SAFE LIFTING PRACTICE
- Common causes of accidents involving lifting
- Responsibilities of:
  - Employers
  - Operators
  - Suppliers
- Planning and conducting a lift
- Elements of a Total Safe Lifting Program (TSLP)
- Lifting equipment definitions
- Basic rigging practice

LEGAL REQUIREMENTS
- Applicable legislation: OHS Act (Industry), DMR 18 (Industry), Minerals Act (Mines)
- Practical implementation of these regulations

LOAD CHARACTERISTICS
- Load estimation
- Centre of gravity
- Balance
- Angles
- Load ratings
- Load balancing: Trigonometric method, Uniform method

TOPIC 14.2
SAFE LIFTING II
LIFTING TACKLE
- Different types
- Features and benefits of different types
- Typical applications
- Sling configurations

LIFTING MACHINES
- Types
- Methods of operation i.e. gear train
- Safety measures
- Overload indicators
- Limit switches

CHAIN SLINGS
- Qualities of chain
- Types of chain
- Specifications
- Traceability
- Heat treatment
- Protective coatings
- Configurations of slings
- Certification
- Markings
- Inspection
- Safe and correct use
- Storage and maintenance

STEEL WIRE ROPE SLINGS
- Rope construction
- Types of ropes
- Splices
- Types of slings
- Accessories
- Correct and safe use
- Inspection of ropes
- Storage and maintenance

TEXTILE SLINGS
- Types of textile slings
- Features and benefits of textile slings
- Configurations
- Applications
- Identification and color coding
- Protection of textile slings
- Correct and safe use of textile slings
- Inspection
- Storage and maintenance

Practical Sessions and Exercises

Several practical exercises relating to:
- Basic rigging practice
- The load
- Lifting tackle
- Lifting machines
- Chain slings
- Steel wire rope slings
- Textile slings
Module 15: Machinery Safety

You Will Learn How To:

- Examine and discuss the basic principles of machinery safety
- Outline the design procedures for safety controls
- Describe machinery protection devices and systems

Overview

This module introduces machinery safety techniques at a basic and practical level whilst following the best available international standards. It begins with an overview of machinery safety issues, introducing the concepts of hazard identification and risk reduction. Recent and far-reaching changes in international safety control standards are outlined along with explanations of SIL, PL and Safety Categories. The principles of safety related electrical control systems are explained followed by an introduction to the application of safety PLCs and networks as applicable to automated production lines. Practical examples such as guard door interlocking applications, two-hand controls, muting, area protection of robot installations and motion detection are then examined.

THE PROGRAM

TOPIC 15.1
BASIC PRINCIPLES OF MACHINERY SAFETY
- Definition of a machine and the scope of machinery controls
- Common hazards and typical safety system solutions
- Machinery safety standards and sources of information
- Hazard identification, risk assessment and risk reduction principles
- Typical machinery safety lifecycle procedures using guidelines from EN and Australian standards

TOPIC 15.2
DESIGN AND APPLICATION OF SAFETY CONTROLS
- Risk reduction by design, safeguarding and information
- Operating principles of sensors and protection devices used in machinery protection
- Introduction to applicable standards: ISO 13849, IEC 62061
- Design requirements for Safety Integrity Levels (SIL) and Performance Levels (PL)
- Principles of safety certified PLCs and safety device networks

TOPIC 15.3
MACHINERY PROTECTION DEVICES AND SYSTEMS
- Emergency stops and guard interlocking
- Guard monitoring relays and the safety relays
- Light curtains and proximity sensors
- Evaluation of approach speeds, safety distances and times

Practical Assignment Exercise

Practical assignments are carried out to gain experience in three key areas of this subject. These are:
- Practical risk assessment using a simple software tool and applied to a typical machine problem
- Determination of SIL or PL requirements of a safety related control solution
- Questionnaire on a machine guarding problem and calculation of safety distances
Module 16: Energy Efficiency

You Will Learn How To:

- Examine and discuss the concept of energy efficiency
- Examine and discuss the direct use of fuel
- Examine and discuss alternative energy sources
- Examine and discuss the main forms of energy
- Describe the process of electrical energy generation
- Discuss electrical energy usage
- Examine energy efficient practices
- Examine and discuss energy efficiency in climate control applications

Overview

Reducing the energy costs at your facility must surely be one of the most effective and achievable strategies for lowering the operating cost. This module provides the practical tools to identify and implement programs and projects to reduce energy consumption in the most effective and practical ways. You will be provided with the skills and latest knowledge on proven methods of making real savings in your energy bills. You will be greatly surprised at the levels of energy loss and the poor efficiency of some of the devices in your facility - some that consume power even when the facility is not operational. These factors are costing your organization money. Energy bills are generally at least 20% of the running costs of a business, so reductions in these bills are directly responsible for better profits. This module will teach you the fundamental principles of energy efficiency by assessing wastage, cost of energy and looking at the benefits you will accrue from improving your facility’s efficiency.

Practical Assignment

Exercise

Energy efficiency calculations (using software) relating to:
- Alternative energy sources
- Electrical energy usage
- Energy efficiency practices
- Climate control applications

Overall case study on designing a complete energy efficient installation.

THE PROGRAM

TOPIC 16.1
ENERGY FUNDAMENTALS

INTRODUCTION TO ENERGY EFFICIENCY
- Energy and the environment
- Energy forms and conversion
- Energy sources and sinks
- Better use of energy
- Channeling waste energy into useful output
- Energy audit and principles
- Basic financials

USING FUEL DIRECTLY
- Improving efficiencies
- Reduction and re-use of heat wastage
- Recovery of exhaust heat from engines
- Energy efficient designs for equipment and buildings
- Cogeneration for better efficiency

TOPIC 16.2
ENERGY SOURCES AND FORMS

ALTERNATIVE ENERGY SOURCES
- Solar
- Wind
- Geothermal
- Tidal
- Small Hydro
- Biofuels
- Hydrogen

MAIN FORMS OF ENERGY
- Energy converted to electricity for direct use
- Electricity in metal smelting
- Fuels for motive power
- Fuels for heating applications

TOPIC 16.3
ELECTRICAL GENERATION AND USAGE

ELECTRICAL ENERGY GENERATION
- Conversion systems for electrical energy
- Commonly used fuels
- Improving conversion efficiencies

ELECTRICAL ENERGY USAGE
- Major users
- Efficiencies in electricity usage
- Uses of electricity

TOPIC 16.4
ENERGY EFFICIENCY

ENERGY EFFICIENT PRACTICES
- Motor efficiency
- Improved T&D practices
- Role of power factor
- Motor rating vs. efficiency
- Energy saving thru VSDs
- Lighting and luminaire efficiencies
- Use of daylight to supplement artificial lighting
- Intelligent buildings

ENERGY EFFICIENCY IN CLIMATE CONTROL APPLICATIONS
- Efficiency in heating and cooling systems
- Reducing heat loss through better design
- Use of waste heat for cooling
- The paradox of cooling
- Use of waste heat for cooling
- Compression refrigeration vs. absorption chillers
Module 17: Renewable Energy Systems

You Will Learn How To:

- Examine and discuss the fundamentals of Renewable Energy
- Examine and discuss Renewable Energy applications
- Perform basic Photovoltaic (PV) system design
- Examine and discuss PV system mechanical design and installation issues
- Perform basic wind system design
- Examine and discuss the fundamentals of turbine technology
- Discuss issues related to the development of Renewable Energy installations
- Discuss issues related to the operation and management of Renewable Energy installations

Overview

In the past decade there has been a significant increase in applying wind and solar power technologies from the domestic user to the corporate market. There has been a dramatic improvement in the efficiencies of these technologies and this has helped to make the applications economical. Specific energy yields from wind turbines have increased by 60% and installation costs have dropped significantly (up to 50% in many cases). Global wind generating capacity has reached 100,000 MW capacity in 2008 with almost 20,000 MW installed during 2007 alone. Applications of photovoltaic (PV) systems are growing rapidly worldwide with world-wide installation of PV modules skyrocketing to 2,826 MW in 2007 (= 62% growth from 2006). Many countries are passing legislation to enforce greater use of PV systems and this is helping to drive up the production of these systems.

All of these technologies are interdisciplinary, requiring a knowledge of topics as varied as aerodynamics, electricity and wind statistics for wind power and mechanical engineering, electronic and electrical engineering for solar power. This module will outline the step-by-step process of designing, installing and commissioning photovoltaic and wind powered systems. It should be emphasized that this is not an advanced in-depth module, but one covering the important issues enabling you to do simple designs and then investigate the design and installation issues in more detail after the module either by further study or in conjunction with experts in the field.

Because of the rapid growth in this field this is a good industry in which to focus one's career on, especially in view of current economic challenges.

THE PROGRAM

TOPIC 17.1 RENEWABLE ENERGY SYSTEMS
INTRODUCTION TO RENEWABLE ENERGY
- Renewable and sustainable energy
- Economics of renewable energy
- Forces driving the technologies

RENEWABLE ENERGY APPLICATIONS
- Solar water heating systems
- Energy efficient building design
- Hybrid energy systems

TOPIC 17.2 PHOTOVOLTAIC (PV) ENERGY SYSTEMS
PV SYSTEM COMPONENTS
- System components and configurations
- Photovoltaic cells
- Modules and arrays

MECHANICAL DESIGN AND INSTALLATION
- Mechanical design
- Panel assembly and roof attachment methods
- Mechanical design problems

TOPIC 17.3 WIND ENERGY SYSTEMS
WIND FUNDAMENTALS
- Mechanics of wind
- Local effects on wind flow
- Wind assessment at a potential site

TURBINE TECHNOLOGY
- System design
- Aerodynamics and power control
- Dynamics and fatigue
- Electricity generation
- Integration

TOPIC 17.4 SYSTEM DEVELOPMENT, OPERATION AND MANAGEMENT
DEVELOPMENT
- Finance
- Site design
- Planning
- Contracts

OPERATION AND MANAGEMENT
- Management
- Site commissioning
- Monitoring and maintenance
- Safety

Practical Sessions and Exercises

Exercises (using software design programs) related to:
- Photovoltaic energy (PV) systems
- Mechanical design and installation of PV systems
- Wind energy
- Turbine technology

Case studies in designing a wind energy and PV systems
Module 18: Industrial Automation

You Will Learn How To:

- Examine and discuss the function and application of PLCs and related devices
- Examine and discuss the attributes of SCADA and DCS systems
- Examine and discuss the basics of Industrial Data Communications systems
- Examine and discuss the operation of Process Control systems
- Examine and discuss the concepts and implementation of Business Systems

Overview

The elements of an industrial control system form part of an interconnected web using Ethernet, field buses and wireless technology. Information is effortlessly transferred from an instrument to the SCADA terminal on a boardroom table. In this module real-life examples from current control system technologies are used to give you the latest background in current vendor solutions. The material is presented in an easy-to-understand practical way, enabling you to apply the concepts quickly and effectively to your next automation project.

Once you have completed the module you should have a good overall understanding of how to harness the power of industrial automation technologies and to deal with contractors and experts working in the area. This will result in the ability to make quicker decisions on the best way forward, resulting in a reduction in the time to design, install and commission industrial automation equipment and, naturally, in reduced costs.

Practical Sessions and Exercises

The program is made highly interactive with PLC demonstrations, HMI (i.e. representing DCS or SCADA) demonstrations, and other demonstrations relevant to Process Control. Delegates will be given a PLC simulator in order to complete a number of PLC design exercises.
Module 19: Measurement and Control Systems

You Will Learn How To:

- Describe the fundamentals of process instrumentation
- Apply the basics of loop tuning
- Perform control valve sizing and selection

Overview

Over the last few decades, dependency on instrumentation equipment has increased tenfold. All of the major industries (mining, oil and gas, chemical plants, etc.) have benefited from this technology, with noticeable improvements in quality, production and recordkeeping. Unfortunately, due to the rapid expansion of instrumentation technology, many people have started to review this as a grey area, understandable only to the select few. This module aims to demystify the field of instrumentation, and to eliminate a lot of the myths that are out there. Furthermore, it aims to promote closer synergy between non-instrumentation and instrumentation personnel, which can only be to the benefit of each and every operation. It is not an in-depth module, but one covering a wide range of topics in Industrial Automation to give you an overview and practical understanding of the key concepts. Nevertheless, a lot of material is covered, with the intent to provide an overview and practical understanding of the concepts and equipment, and how they all converge to create an efficient and safe control environment in instrumentation, process control, SCADA, PLCs and control valves.

THE PROGRAM

TOPIC 19.1
INSTRUMENTATION I
- Introduction to process measurement
- Pressure measurement
- Level measurement
- Temperature measurement
- Flow measurement

TOPIC 19.2
INSTRUMENTATION II
- Process considerations
- System integration
- Conversion between analog values and SCADA displayed values
- Effects of filtering
- Aliasing and too low scan rates

TOPIC 19.3
PROCESS CONTROL
- Fundamentals of loop tuning
- Tuning rules
  - Ziegler Nichols open loop tuning
  - Ziegler Nichols closed loop tuning
  - Trial & error tuning
- Tuning of valves
- Simple tuning of more complex systems
- Good practice

TOPIC 19.4
CONTROL VALVES I
- Different types of control valves
- Control valve characteristics
- Selecting right type of control valve for given application
- High pressure drop applications

TOPIC 19.5
CONTROL VALVES II
- Actuators
- Positioners
- Materials
- Installation and maintenance
- Control valve sizing:
  - Manually
  - With software

Practical Sessions and Exercises

You will use a process control simulation program to perform several simple loop tuning exercises using a control valve as one of the control elements, and will also be given graphs of existing loops, so that you can calculate the PID values best suited to the application. In addition to this, the on-line sessions will incorporate several practical demonstrations.
Module 20: Management of Hazardous Areas

You Will Learn How To:

- Examine and discuss the background to hazardous area management
- Describe area classification and protection concepts
- Examine and discuss standards, certification, selection and installation of equipment

Overview

This module provides you with an understanding of the hazards involved in using electrical equipment in potentially explosive atmospheres. It is based on the international IEC79 series of standards that are now replacing the older national standards. Explosion-proof installations can be expensive to design, install and operate. The wider approaches described in these standards can significantly reduce costs whilst maintaining plant safety. The associated terminology and its correct use are explained throughout the module. It will cover area classification, selection of explosion protected electrical apparatus as well as describing how protection is achieved and maintained in line with these international requirements. Standards require that engineering staff and their management are trained effectively and safely in hazardous areas and this module is designed to help fulfill that need.

Practical Sessions and Exercises

Demonstration videos of explosions to show the effectiveness of the protection principles covered in the class, how static electricity can lead to ignition, and the effect of electrical arcing.

Additional exercises to demonstrate the basic principles of hazardous areas.

THE PROGRAM

TOPIC 20.1 INTRODUCTION

- Explosion consequences
- Definition of hazardous areas
- Properties of gases
- Flammable gases, vapors and ignition sources
- Protection requirements

TOPIC 20.2 ZONES AND DEFINITIONS

- Area classification (zones)
- Apparatus or Gas group
- Temperature (‘T’) rating
- Ingress Protection (IP) rating
- Principles of Ex protection
- Protection Concepts
  - Flameproof Ex d
  - Increased Safety Ex e
  - Non Incendive Ex n
  - Intrinsic safety Ex i
  - Pressurized/Purged Ex p
  - Oil Filled Ex o
  - Sand/Powder/Quartz Filled Ex q
  - Encapsulated Ex m
  - Special Protection Ex s

TOPIC 20.3 STANDARDS, CERTIFICATION, SELECTION AND INSTALLATION OF EQUIPMENT

- Authorities
- Marking and identification
- Certification
- Descriptive Systems Documentation
- Interconnected apparatus
- Systems approach
- Safety descriptions
- Codes of practice
- National standards
- Safe area apparatus and requirements
- Interconnecting cabling
- Hazardous area junction boxes and apparatus
You Will Learn How to:

- Examine and discuss the background to Project Management
- Apply the basics of Time Management
- Examine and discuss the fundamentals of project cost management
- Apply integrated time and cost management techniques to a project
- Examine and discuss issues relate to the management if the Project Team
- Discuss the fundamentals of Quality Management
- Discuss the fundamentals of Risk Management

Overview

More and more engineering and technical professionals are making career transitions from product design into project management. This, however, requires formal training and a willingness to learn new skills. All the technical know-how in the world will not deliver a project successfully, without proper project management skills. Unfortunately very few engineering professionals have any degree of formal project management training, which results in a great deal of personal stress as well as cost blowouts and other woes. The lack of training often applies to the ‘people skills’ required for effectively leading the project team.

To address this problem, this module will focus on the critical project-related activities such as work breakdown, scheduling, cost control and risk management, and show how these can be performed with software to lighten the project manager’s workload. The ‘soft’ (but equally important) aspects such as team leadership and contract law are also covered.

THE PROGRAM

TOPIC 21.1  FUNDAMENTALS AND TIME MANAGEMENT

FUNDAMENTALS
- Overview of the project environment
- Project life cycle and phases
- Project organizations
- Success criteria and critical success factors
- Project planning

TIME MANAGEMENT
- Overview of the project environment
- Project life cycle and phases
- Project organizations
- Success criteria and critical success factors
- Project planning

TOPIC 21.2  COST MANAGEMENT TECHNIQUES

COST MANAGEMENT
- Cost estimating
- Budget presentation
- Financial control
- Change control
- Cost reporting
- Value management

Practical Sessions and Exercises

You will use a process control simulation program to perform several simple loop tuning exercises using a control valve as one of the control elements, and will also be given graphs of existing loops, so that you can calculate the PID values best suited to the application. In addition to this, the on-line sessions will incorporate several practical demonstrations.