



TRAINING FOR INDUSTRY

NSDP

METAL INDUSTRIES COMPANY LIMITED

SHORT COURSES



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BUSINESS MANAGEMENT, Level I

40 Contact Hours- Part-time Certificate Course

OVERVIEW

This course covers the fundamental aspects of management with specific reference to employee/employer relationships and their effect on the bottom line. It identifies management techniques to improve production, communication and financial efficiency.

PRE-REQUISITES

Direct involvement in production and in the supervision of personnel, coupled with training in "The Principles of Business" are desirable.

TARGET GROUP

Lead hands, foremen and supervisors
Senior tradesmen and technicians
Graduate engineers
Managers with informal training

COURSE OUTLINE

- Introduction to Business Management
- Human Relations/Industrial Relations
- Systems Approach to Management
- The Components of Management
- Leadership
- Fundamentals of Marketing
- Production Management
- Technology in Production

EXPECTED OUTCOMES

On successful completion of this course participants will be able to:

1. Define the role of the manager
2. Identify and explain the skills required in managing a business
3. Apply production management techniques
4. Explain various leadership styles

PRINCIPLES OF HEAT TREATMENT

40 Contact Hours — Part-time Certificate Course

OVERVIEW

This course covers the fundamental methods used to modify material structure from a usage perspective. It concentrates on the use of heat to harden, toughen and soften (anneal) various types of materials. It looks at the need to modify surface characteristics in the manufacture of equipment.

PRE-REQUISITES

Direct involvement in the metal working industry using heat and /or bending methods, and a good physical science background are desirable.

TARGET GROUP

Persons/ Technicians who want a better knowledge of the fundamentals of heat treatment
Persons new to heat treatment

COURSE OUTLINE

- General aspects of heat treatment
- Microstructure and mechanical properties of steel
- Annealing, tempering, normalising and handling of steel
- Heat treatment of tool steels
- Heat treatment of non-ferrous metals and alloys

EXPECTED OUTCOMES

On successful completion of this course participants will be able to:

1. Describe the treatment of cast iron and stainless steel
2. Identify the properties of steels produced by solid-state changes
3. Use surface treatment to increase wear resistance
4. Measure the hardness of materials

PRINCIPLES OF FAILURE ANALYSIS

40 Contact Hours — Part-time Certificate Course

OVERVIEW

This course covers the fundamental causes of material failure from a usage perspective. It identifies how various manufacturing processes and equipment operation affect materials and cause failures. It looks at the state of materials before and after a failure and the techniques used to identify the cause of the failure.

PRE-REQUISITES

Direct involvement in welding practice, manufacturing processes, quality control, and a good physical science background are desirable.

TARGET GROUP

Engineers
Technicians
Supervisors
Quality and Inspection Personnel

COURSE OUTLINE

- General procedures for failure analysis
- Failure mechanisms
- Types of failure and stress
- Ductile and brittle fracture
- Wear, corrosion, fatigue and elevated temperature failures

Failures of the following:

- Cast and wrought ferrous metals
- Welded, brazed and soldered joints
- Tools and dies
- Shafts, bearings and gears
- Broilers, heat exchanges and pressure vessels

EXPECTED OUTCOMES

On successful completion of this course participants will be able to:

1. Identify and define failure analysis techniques
2. Identify fundamental sources of failure
3. Use analytical techniques to determine the cause of material failure

METALLURGY FOR THE NON-METALLURGIST

40 Contact Hours — Part-time Certificate Course

OVERVIEW

This course covers the fundamental aspects of material structure from a usage perspective. It identifies how various manufacturing processes affect materials with specific regard to safety. It looks at the state of materials after initial manufacture or modifications are made.

PRE-REQUISITES

Direct involvement in welding practice, manufacturing processes using heat and / or bending methods and a good physical science background are desirable.

TARGET GROUP

Persons involved in metalworking

COURSE OUTLINE

- A history of metals
- Characteristics of materials and the selection process
- Mechanical properties and their management
- Industrial application and metallurgy of steels
- Cast iron and non ferrous metals
- Joining of metals
- Heat treatment of steel
- Corrosion and corrosion prevention
- Quality control and failure analysis

EXPECTED OUTCOMES

On successful completion of this course participants will be able to discuss the basic technology of the following:

- Heat Treatment Welding
- Casting Metal Forming
- Forging Electro Plating
- Corrosion Prevention Testing
- Machining

NDT DYE PENETRANT

40 Contact Hours — Part-time Certificate Course

OVERVIEW

This course covers the fundamental aspects of non-destructive testing. It identifies specific techniques used to test materials for structural soundness with specific regard to safety. It looks at the state of materials after initial manufacture or after prolonged use under stressful conditions.

PRE-REQUISITES

Direct involvement in welding practice, manufacturing processes using heat and / or bending methods and a good physical science background are desirable.

TARGET GROUP

Persons who are required to inspect weldments and other components for signs of flaws
Persons who wish to develop a career in NDT

COURSE OUTLINE

- The structure of materials
- The effect of heat and stress on materials
- Failure analysis
- Crack and other material flaws and their propagation
- The crystal structure in materials and how they are formed

EXPECTED OUTCOMES

On successful completion of this course participants will be able to:

1. Identify flaws using visual insight method.
2. Identify flaws using PT and MT methods.
3. Evaluate defects to determine acceptance or rejection of parts.
4. Prepare reports based on findings of tests.

WELDING METALLURGY Level I

40 Contact Hours — Part-time Certificate Course

OVERVIEW

This course covers the fundamental aspects of metallurgy as it applies to welds and welding processes. It identifies techniques specific to the welding of mild steel and prepares participants for general non-critical welding in industry.

PRE-REQUISITES

Direct involvement in welding practice and a good science background are desirable.

TARGET GROUP

Engineers and metallurgists who are about to become involved in welding
Designers
Quality control and quality assurance personnel
Instructors

COURSE OUTLINE

- Metallurgy of fusion welds
- Fabrication problems
- Welding metallurgy
- Materials and welding metallurgy with respect to fabrication codes and standards
- Solution of practical problems in welding metallurgy with emphasis on alloy systems

EXPECTED OUTCOMES

On successful completion of this course participants will be able to:

1. Identify factors governing welding process selection
2. Use various methods to determine weld ability
3. Use various techniques to avoid common welding fabrication problems

PRINCIPLES OF PROCESS CONTROL

40 Contact Hours — Part-time Certificate Course

OVERVIEW

This course covers the fundamental aspects of control systems and techniques used in the process industry. It targets control equipment and the integration of the equipment with various systems. It provides participants with the opportunity to manipulate processes in a safe environment before tackling dangerous processes.

PRE-REQUISITES

Direct involvement in process plant and control operations and a good science background are desirable.

TARGET GROUP

Operators
Technicians
Process Operators (entry level)

COURSE OUTLINE

- Process fundamentals
- Processing operations
- Process control systems, methods and equipment
- Health and environmental issues in the process industry

EXPECTED OUTCOMES

On successful completion of this course participants will be able to:

1. Operate and identify control systems, instruments, utilities
2. Perform sampling and quality control procedures

INSTRUMENTATION Level I

40 Contact Hours — Part-time Certificate Course

OVERVIEW

This course covers the fundamental aspects of instruments; their types, uses and operating parameters. It identifies measured values and the methods used for obtaining these values. It provides participants with the opportunity to use, calibrate and service instruments in a safe and structured environment.

PRE-REQUISITES

Direct involvement in process operations and the installation and maintenance of instruments, coupled with a good science background are desirable.

TARGET GROUP

Operators and Technicians with 2-3 years experience
Craftsmen and Master Craftsmen

COURSE OUTLINE

- Safety
- Concepts and quality measurements
- Electrical force torque and speed measurements
- Pressure use and measurement
- Flow measurement
- Liquid level measurement
- Temperature measurement
- Final control elements and actuators
- Records automatic controllers and Tele-metering
- Feed-back and feed-forward methods
- Types of control loops

EXPECTED OUTCOMES

- On successful completion of this course participants will be able to:
1. Explain the importance of instrumentation in the process industry.
 2. Use electrical measuring instruments
 3. Explain force torque and speed measurements.
 4. Perform flow measurements.
 5. Perform pressure measurements.
 6. Perform temperature measurements
 7. Demonstrate the working of recorders and recording equipment

INDUSTRIAL BLUE PRINT READING (Manufacturing)

40 Contact Hours- Part-time Certificate Course

OVERVIEW

This programme has been developed to expose persons within the manufacturing industry to drawing blueprints for the purpose of inspections, assembly and machining.

PRE-REQUISITES

To attempt this course, participants must have the following:

- A Certificate/ Diploma in a Tech/Voc discipline
- A Journeyman Certificate
- A suitable combination of Tech/Voc and C.X.C training and education
- A basic knowledge of technical drawing or experience in a related discipline

TARGET GROUP

Engineers
Technicians
Craftsmen
Quality Assurance/Quality Control Inspectors
Interested Persons

COURSE OUTLINE

- Lines and Lettering
- Page Layout
- Measuring Tools
- Isometric Projection
- Orthographic Projection
- Parts and Assembly Drawings
- Machining Symbols
- Tolerances

EXPECTED OUTCOMES

On successful completion of this course participants will be able to:

1. Draw mechanical components
2. Make freehand sketches of Isometric Drawings
3. Interpret assembly drawings
4. Use engineering specifications on drawings
5. Produce a bill of material

INDUSTRIAL BLUE PRINT READING

(Process and Petrochemical)

40 Contact Hours- Part-time Certificate Course

OVERVIEW

This programme has been developed to expose persons within the petrochemical industries to drawings relating to piping, instruments, electrical supplies and other related process equipment.

PRE-REQUISITES

:

To attempt this programme, participants must have the following:

- A Certificate/ Diploma in a Tech/Voc discipline
- A Journeyman Certificate
- A suitable combination of Tech/Voc and C.X.C training and education
- A basic knowledge of technical drawing or experience in a related discipline

TARGET GROUP

Engineering Graduates

Technicians

Craftsmen

Quality Assurance/Quality Control Inspectors

Interested Persons

COURSE OUTLINE

- Lines and Lettering
- Plant Equipment Symbols
- Piping and Instrument Symbols
- Structural Drawing/Symbols
- Pneumatic/Hydraulic Components
- Electrical Drawing/Symbols
- Practical Projects

EXPECTED OUTCOMES

On successful completion of this course participants will be able to:

1. Interpret piping and instrument diagrams
2. Construct Isometric Piping
3. Construct Orthographic Projection
4. Make simple free hand sketches
5. Produce a bill of material

TRAIN THE TRAINER: LEVELS I, II, III

120 Contact Hours- Part-time Certificate Course

OVERVIEW

This course equips participants with the ability and techniques for delivering training in different settings - formal and informal – in the work place.

PRE-REQUISITES

Direct involvement in training and a good general education background are desirable.

TARGET GROUP

Level I – Entry-Level Trainers

Level II -Practising Trainers, Training Officers, Tutors

Level III - Senior Training Personnel, Training Managers, Training Supervisors and Training Co-ordinators

COURSE OUTLINE

- Training vs. Education
- The Role of the Trainer
- The Role of Communication in Training
- Instructional Methods
- Audio Visual Media
- Training Needs Analysis and Identification of Training Needs
- Planning Training
- Adult Learning Techniques
- Delivering a Lesson

EXPECTED OUTCOMES

On successful completion of this course participants will be able to:

1. Demonstrate the difference between training and education
2. Define the role of the trainer
3. Use appropriate training media
4. Use audiovisual technology
5. Use instructional methods

INDUSTRIAL SUPERVISORY MANAGEMENT

40 Contact Hours- Part-time Certificate Course

OVERVIEW

This course equips participants with the ability and techniques for supervising employees in an industrial setting. Planning, organizing and team building segments are included to meet the needs of modern industry. Many of the techniques taught are also applicable to problem solving and dispute resolution.

PRE-REQUISITES

Involvement in industry operations and a good general education background are desirable.

TARGET GROUP

Entry-level Supervisors
Craftsman and Technicians with at least three (3) years experience
Graduate Engineers, Foremen and Charge-Hands in Industry

COURSE OUTLINE

- Role and responsibility of a supervisor
- Planning and organizing to achieve desired results
- Problems solving/counseling
- Performance appraisal
- Business communication
- Team leadership
- Organizational structure
- Total Quality Management
- Training and Development
- Financial Management

EXPECTED OUTCOMES

On successful completion of this course participants will be able to:

1. Supervise various levels and categories of employees in their charge
2. Lead and inspire team members
3. Ensure the existence of proper lines of communication
4. Set up and maintain proper quality control systems
5. Practise the fundamental principles of financial management

SMAW PIPE WELDING

120 Contact Hours

OVERVIEW

This course covers specific aspects of welding practice and equipment, simultaneously as it seeks to equip the participants with the necessary competencies and make them industry-ready. It identifies techniques specific to the welding of low carbon steel 6" schedule 40 pipe according to AWS D1:1, API 1104 and ASME SEC IX.

PRE-REQUISITES

1. Experience in the use of electrodes E 6010 and E 7018
2. Pre-entrance test in the 3G position low carbon steel plate ½ " x 4" x 12".

TARGET GROUP

1. Persons who have completed SMAW Level I and Level II welding and wish to improve their skills for pipe welding
2. Uncoded SMAW plate and pipe welders
3. Shielded Metal Arc Welding – S.M.A.W.
4. Experienced welders who wish to be certified

COURSE OUTLINE

- Occupational safety, health and environment as it pertains to arc and gas technology
- Electrode and electrode classification and usage
- Introduction to metallurgy and welding metallurgy
- Distortion and control of residual stresses
- Introduction to welding symbols and blueprint reading
- Inspection and quality control
- Welding and cutting techniques

EXPECTED OUTCOMES

On successful completion of this course participants will be able to:

1. Follow safety procedures as it pertains to personal and general shop safety
2. Follow safety procedures in setting up and shutting down arc and gas welding/cutting equipment
3. Recall related technology in all skill disciplines identified
4. Perform proper techniques in welding low carbon steel 6" schedule to pipe 6G position

WELDING TECHNOLOGY LEVEL II

40 Contact Hours Part time Certificate Course

OVERVIEW

This course covers specific aspects of welding practice and equipment. It identifies techniques specific to the welding of mild steel and prepares participants for specific non-critical welding in the industry. Additional fabrication techniques are practised.

PRE-REQUISITES

Direct involvement in welding practice and a good science background are desirable.

TARGET GROUP

Experienced welders with limited training
Persons who have completed welding level I and wish to improve their knowledge of welding technology

COURSE OUTLINE

- Introduction to the principles of MIG welding
- Identifying and using equipment safety
- ARC welding safety
- MIG welding equipment
- Shielded gases
- Filler wires
- Techniques and orations in MIG welding
- Practical exercises
- Inspection and quality control

EXPECTED OUTCOMES

On successful completion of this course participants should be able to:

1. Set-up and operate TIG/MIG welders
2. Set-up and operate conventional ARC and GAS welding equipment
3. Operate at a high level of technical competence
4. Work mild steel plates in 1G, 2G and 3G positions
5. Explain and practise equipment safety

WELDING TECHNOLOGY LEVEL I

40 Contact Hours- Part-time Certificate Course

OVERVIEW

This course covers the fundamental aspects of welding practice and equipment. It identifies techniques specific to the welding of mild steel and prepares participants for general non-critical welding in the industry. Certain fabrication techniques are introduced.

PRE-REQUISITES

Direct involvement in welding practice and a good science background are desirable.

TARGET GROUP

Welders with no formal training
Artisans and Fabricators

COURSE OUTLINE

- Principles and practices of shielded metal arc welding (SMAW)
- Principles and practices of oxyacetylene welding (OAW)
- Welding symbols and blueprint reading
- Welding inspection and quality control
- Residual stresses and distortion control
- Fundamentals of electricity

EXPECTED OUTCOMES

On successful completion of this course participants will be able to:

1. Weld mild steel in the flat position
2. Make decisions about welding techniques for mild steel
3. Practise safety in welding

MACHINING LEVEL II - (CAD/CAM/CNC)

40 Contact Hours- Part-time Certificate Course

OVERVIEW

This course introduces participants to on-the-machine programming, using design and machining software to generate drawings, and programming/downloading the programme to CNC equipment.

PRE-REQUISITES

Successful completion of "Machining, Level I" is mandatory.

A good working knowledge of technical drawing is necessary.

Direct involvement in machine shop practice and a good science background are desirable.

TARGET GROUP

General Machinists interested in improving their technical skills

Specialised Machinists interested in widening their knowledge in machining

Persons who have completed a basic machine shop course

Engineers

COURSE OUTLINE

- Comparison of Conventional and CNC Machines
- Absolute and incremental dimensions
- Machines, axes and machining planes
- Tool compensation, tool offsets.
- G Functions—G0, G1, G2, G3, G8, G17, G19
- Modes control, reference point machine zero with respect to work piece zero
- Introduction to CAD
- Canned cycles for drilling, milling and turning
- M-functions M0, M3, M4, M6, M8, M9
- 3D

EXPECTED OUTCOMES

On successful completion of this course participants will be able to:

1. Introduce advanced techniques and theories in general machining
2. Demonstrate expertise in precision machining
3. Introduce CNC machine techniques
4. Manipulate CNC programmes and special codes
5. Continue to practise the techniques learnt

MACHINING LEVEL II - (GEARS AND GEAR CUTTING)

40 Contact Hours — Part-time Certificate Course

OVERVIEW

This course covers some advanced aspects of machine shop practice and equipment. It is concerned specifically with the practice of developing and cutting various gear shapes and types. Other specific gear making techniques are discussed.

PRE-REQUISITES

Successful completion of the Machining Level I course is mandatory.
Direct involvement in machine shop practice and a good science background are desirable.

TARGET GROUP

Machinist with 3-5 years experience

COURSE OUTLINE

- Definition of Gear Terms
- Cutting Spur Gearing
- Cutting Helical Gearing
- Cutting Worm Gearing
- Clamping Devices
- Gear Hobbing

EXPECTED OUTCOMES

On successful completion of this course participants will be able to:

1. Identify various types and parts of gears
2. Calculate the various gear parameters
3. Identify and select gear cutting form modules
4. Set up and cut spur gears and helical gears

MACHINING LEVEL II (GENERAL)

40 Contact Hours- Part-time Certificate Course

OVERVIEW

This course covers some advanced aspects of machine shop practice and equipment. It strengthens machining techniques and uses the concepts taught on Level I in specialized machining operations.

PRE-REQUISITES

Successful completion of the Machining Level I course is mandatory. Direct involvement in Machine Shop practice and a good science background are desirable.

TARGET GROUP

Practising craftsmen
Workshop personnel requiring re-grading and training
Engineers, engineering managers and supervisors

COURSE OUTLINE

Use and care of cutting tools
The range of capabilities of machine tools such as lathes, milling machines and grinders
Non-conventional machining processes including EDM and ECM
CNC technology and the impact on industry
Use of CAD /CAM technology

EXPECTED OUTCOMES

On successful completion of this course participants will be able to

1. Use advanced Machine Shop techniques
2. Use turning accessories e.g. face plates, four jaw independent chucks, steadies and taper turning attachments
3. Identify, sharpen and use various drill bits and cutting tools
4. Turn tapers, cut threads, use boring bars and form turning tools
5. Perform simple heat treatment processes
6. Identify grinding wheel markings, balance the wheel and perform manual surface grinding operations
7. Do calculations necessary to set up dividing head operations

MACHINING LEVEL I (GENERAL)

40 Contact Hours — Part-time Certificate Course

OVERVIEW

This course covers the fundamental aspects of machine shop practice and equipment. It identifies machining techniques and introduces participants to work planning, cutting calculations and selection of the correct cutting tools.

PRE-REQUISITES

Direct involvement in machine shop practice and a good science background are desirable.

TARGET GROUP

Persons desiring retraining, upgrading or specific training
Craft and technician graduates requiring practice and technology
Engineers and supervisors

COURSE OUTLINE

- Introduction to safety practices in machining
- Machine and Bench Tools
- Cutting fluids, single point cutting tools
- Milling Machines/Cutters
- Special Machining Process (Intro)
- Introduction to CNC Machining (Video)
- Limits and Fits
- Lathe Machines (Speeds and Feeds)
- Lathe operation (Turning and Facing) taper, cutting, thread cutting.
- Surface grinding of machines
- Introduction to Blue Print Reading
- Review

EXPECTED OUTCOMES

On successful completion of this course participants will be able to:

1. Highlight machining safety practices
2. Implement the concept of general machining (Lathes, Mills, and Drilling Machines).
3. Demonstrate workshop equipment versatility
4. Use speeds and feeds for various materials
5. Grind specific tool bits.

POWER ELECTRONICS

40 Contact Hours- Part-time Certificate Course

OVERVIEW

This course focuses on the development of sound electronic handling techniques and practices based on international standards. It concentrates on the design and operations of electronic components and systems used to deliver power and the various circuits that comprise electronic power systems.

PRE-REQUISITES

Successful completion of the course "Principles of Electronics"

A sound working knowledge of electronic systems and a good science background are desirable.

TARGET GROUP

Electrical/electronic technicians and craftsmen with 3 years experience

Maintenance technicians

Graduate engineers

COURSE OUTLINE

- Operation characteristics of Power Electronic components
- Switch gear types and application
- Protection devices and their uses
- Measuring and testing methods
- Three phase drives
- Phase control of motor speeds
- Fuse and feedback protection
- Digital and analogue switching

EXPECTED OUTCOMES

On successful completion of this course participants will be able to:

1. Describe the operation and characteristics of power electronic components.
2. Use various testing techniques to determine faulty components in systems.
3. Identify the applications of Thyristor control methods employed in static and dynamic systems.

PRINCIPLES OF ELECTRONICS

40 Contact Hours - Part-time Certificate Course

OVERVIEW

This course focuses on the development of sound electronic handling techniques and practices based on international standards. It concentrates on the beginnings of electronic components and systems, analogue systems and the various circuits that comprise electronics.

PRE-REQUISITES

A sound working knowledge of electronic systems and a good science background are desirable.

TARGET GROUP

Entry-level personnel in the electronic field
Electronic repair technicians
Radio and T V repair technicians

COURSE OUTLINE

- Introduction
- Safety
- Measuring instruments
- Testing methods
- Replacement techniques
- Operation characteristics
- Application of components
- Build simple circuits using diodes, resistors and capacitors

EXPECTED OUTCOMES

On successful completion of this course participants will be able to:

1. Identify, use and care for various types of measuring instruments used in electronic systems.
2. Describe the procedures used in testing components and systems.
3. Use the operational characteristics in the selection and operation of semiconductor devices.
4. Identify the various applications of electronic devices.

PLC LEVEL II

40 Contact Hours - Part-time Certificate Course

OVERVIEW

This course provides participants with additional tools for programming and trouble shooting PLC systems. It introduces specific programming techniques for more complex PLC programmes and control systems.

PRE-REQUISITES

Successful completion of the course "PLC Level I"

Direct involvement in control systems, PLCs and a good science background are desirable.

TARGET GROUP

Operators in the energy and industrial sectors

Maintenance persons working in the electrical controls area

Engineers and technicians

COURSE OUTLINE

Review Level I types of PLC programming

Conversion from one version to another

Timers, counters and programming methods

Instruction parameters and their application

System analysis methods

Programme optimization

EXPECTED OUTCOMES

On successful completion of this course participants will be able to:

1. Use different types of PLC programming and switch from one version to another.
2. Use timely counters and programming methods.
3. Describe and apply instruction parameters
4. Use ZCL and MCR
5. Operate, maintain and troubleshoot PLC systems.
6. Describe and use instructions e.g. Bit shift, FIFO and LIFO

PLC LEVEL I

40 Contact Hours - Part-time Certificate Course

OVERVIEW

This course provides participants with the initial tools for programming and trouble shooting PLC systems. It identifies techniques specific to PLC programming and control systems.

PRE-REQUISITES

Successful completion of "IM Electrical Power and Controls"

Direct involvement in control systems and a good science background are desirable.

TARGET GROUP

Operators in the energy and industrial sectors

Maintenance persons working in the electrical controls area

Engineers and technicians

COURSE OUTLINE

- Safety
- Equipment overview
- Programming bases
- Relay type constructions
- Schematics, control circuits and special rotation
- Tools, safety, cleaning, communications
- Maintenance and repairs
- Fundamentals of pneumatics and hydraulics

EXPECTED OUTCOMES

On successful completion of this course participants will be able to:

1. Describe the relationship between programmable controllers and hard-wired relay circuits
2. Perform simple programming using input/output addresses and internal addresses
3. Investigate and identify the features of the PLC
4. Perform wiring connections
5. Troubleshoot programme and wiring errors

IM REFRIGERATION AND AIR CONDITIONING – LEVEL I

40 Contact Hours - Part-time Certificate Course

OVERVIEW

This course covers the fundamental aspects of refrigeration systems, maintenance practice and equipment. It identifies techniques specific to refrigeration systems and air quality control, and enhances the faultfinding techniques of the IM General I and II courses.

PRE-REQUISITES

Successful completion of "IM General Level I"

Involvement in refrigeration and air conditioning practice and a good science background are desirable.

TARGET GROUP

Maintenance Personnel

Operators

Supervisors

Engineers

COURSE OUTLINE

- Safety and housekeeping
- Reading and interpreting standard refrigeration drawings
- Faultfinding and troubleshooting techniques
- Fundamentals of the refrigeration cycle
- Methods of mechanical cooling
- Types of refrigerants and their uses
- Welding and braising

EXPECTED OUTCOMES

On successful completion of this course participants will be able to:

1. Identify the general principles and techniques of refrigeration
2. Use the correct techniques and equipment for vacuuming and re-gassing systems
3. Describe the Montreal Protocol
4. Practice proper refrigeration recovery techniques
5. Troubleshoot refrigeration problems

FLUID POWER AND CONTROLS – LEVEL II (Hydraulics/Pneumatics)

40 Contact Hours - Part-time Certificate Course

OVERVIEW

This course covers advanced aspects of fluid power systems, maintenance practice and equipment. It explains engineering calculations and decision techniques specific to fluid power systems. Advanced safety and maintenance techniques are demonstrated.

PRE-REQUISITES

Successful completion of "Fluid Power and Controls Level I"
Considerable involvement in fluid power practice and a good science background are desirable.

TARGET GROUP

Maintenance Personnel
Operators
Supervisors
Engineers

COURSE OUTLINE

- Introduction to multi-stage control
- Method of circuit control time schedules, sequence control
- Function diagrams in circuit construction
- Operations of "AND" and "OR" functions
- Introduction to Electro-Fluidic Systems
- Electrical Theory related to circuit design
- Component Operations
- System Troubleshooting
- Circuit Design

EXPECTED OUTCOMES

On successful completion of this course participants will be able to:

1. Identify hazards and practice safe working habits in operating and maintaining compressed air and hydraulic equipment
2. Determine applications of Pneumatics and Hydraulics
3. Apply types of cylinders to specific problems
4. Apply Pneumatics and Hydraulics valves to create appropriate solutions
5. Design and build medium to complex Pneumatics and Hydraulics circuits
6. Diagnose and rectify faults in Pneumatics and Hydraulics systems
7. Do calculations related to force, speed, temperature, and efficiency

FLUID POWER AND CONTROLS – LEVEL I (Hydraulics/Pneumatics)

40 Contact Hours - Part-time Certificate Course

OVERVIEW

This course covers the fundamental aspects of fluid power systems, maintenance practice and equipment. It identifies techniques specific to fluid power systems and enhances the faultfinding techniques of the IM General I and II courses.

PRE-REQUISITES

Successful completion of "IM General Level I"
Involvement in fluid power practice and a good science background are desirable.

TARGET GROUP

Maintenance Personnel
Operators
Supervisors
Engineers

COURSE OUTLINE

- Safety and housekeeping
- Interpretation of DIN and other international drawing standards
- Faultfinding and troubleshooting techniques
- Fundamentals of controls using step and displacement diagrams
- Components and their function
- Introduction to electro-fluidics

EXPECTED OUTCOMES

On successful completion of this course participants will be able to:

1. Identify the general principles of pressure and flow generation
2. Use the correct equipment to control pressure and flow
3. Apply safety policies and regulations to fluid power installations
4. Determine the correct fluid to be applied given the specific criteria
5. Troubleshoot plant equipment

IM MECHANICAL SYSTEMS

40 Contact Hours - Part-time Certificate Course

OVERVIEW

This course covers the fundamental aspects of mechanical maintenance practice and equipment. It identifies techniques specific to mechanical systems and enhances the work planning techniques of the IM General I and II courses.

PRE-REQUISITES

Successful completion of "IM General Level I"

Direct involvement in maintenance practice and a good science background are desirable.

TARGET GROUP

Maintenance Personnel

Operators

Supervisors

Engineers, Technicians and Experienced Craftspeople

COURSE OUTLINE

- Safety and housekeeping
- Use and care of tools and measuring equipment
- Interpretation of drawings
- Lubrication and troubleshooting
- Maintenance and repair of mechanical and machine elements
- Work-based project

EXPECTED OUTCOMES

On successful completion of this course participants will be able to:

1. Identify, select and use tools to perform routine maintenance
2. Install plant and equipment
3. Apply safety policies and regulations to maintenance and repairs
4. Determine correct lubrication and lubricants for various types of equipment
5. Troubleshoot plant equipment

IM ELECTRICAL POWER AND CONTROLS

40 Contact Hours- Part-time Certificate Course

OVERVIEW

This course combines industrial, electrical and control systems into a single unit. It covers the fundamental aspects of electrical maintenance and control practice and equipment. It also identifies control techniques in general use in the industry and introduces participants PLC systems.

PRE-REQUISITES

Successful completion of "IM General Level I"

Direct involvement in maintenance practice and a good science and electrical background are desirable.

TARGET GROUP

Maintenance technicians/craftspeople

Machine operators

Engineers and supervisors

COURSE OUTLINE

- Safety
- Tools and cleaning methods specific to electrical equipment
- Maintenance and repair of motors, starters, breakers, transformers
- Introduction to relay logic and PLC controls
- Installation of Power and Control systems
- Protection

EXPECTED OUTCOMES

On successful completion of this course participants will be able to:

1. Apply safety rules and regulations to electrical equipment and controls
2. Apply control techniques
3. Identify common motors and describe their construction
4. Describe and identify ancillary attachments and equipment
5. Work with digital control and basic PLC programmes

IM INDUSTRIAL ELECTRICAL

40 Contact Hours - Part-time Certificate Course

OVERVIEW

This course focuses on the development of sound electrical techniques and practices based on international standards. It compares DIN and NEMA systems and provides fundamental design, troubleshooting and faultfinding methods used in industrial electrical systems.

PRE-REQUISITES

Successful completion of "IM General Level I"

A sound working knowledge of and experience in the operation of electrical power systems, coupled with a good science background are desirable.

TARGET GROUP

Craftspeople and Technicians with 2-3 years experience

Graduate Engineers

COURSE OUTLINE

- Safety
- Arc and Magnetic Suppression
- Inductive and capacitive effects
- Starting and Switch Gear Technology
- Protection
- Dismantlement and analysis of motors, starters, switches and breakers
- Conduit-bending using calculations
- Analysis of trip mechanisms

EXPECTED OUTCOMES

On successful completion of this course participants will be able to:

1. Demonstrate improved skills and knowledge in electrical power systems
2. Apply safety procedures and regulations
3. Explain prevailing local factory and electrical regulations
4. Practice proper maintenance methods and principles of electrical power systems

IM CONTROL SYSTEMS

40 Contact Hours - Part-time Certificate Course

OVERVIEW

This course focuses on the development of sound control techniques based on international standards. It compares DIN and NEMA systems and provides fundamental design, troubleshooting and fault finding methods.

PRE-REQUISITES

Successful completion of "IM General Level I"

A sound working knowledge of and experience in the operation of control systems, coupled with a good science background are desirable.

TARGET GROUP

Maintenance Personnel

Operators

Supervisors

Engineers

COURSE OUTLINE

- Safety rules and procedures
- Definitions of control elements and control logic
- Types of control systems
- Relay logic and PLCs
- Reading Schematics (DIN and NEMA)
- Building and troubleshooting control systems

EXPECTED OUTCOMES

On successful completion of this course participants will be able to:

1. Demonstrate improved knowledge and skills in electrical control systems
2. Provide logical structures for the design of control systems.
3. Use logical methods for troubleshooting controls.
4. Read standard international drawings for relay logic controllers.

INDUSTRIAL MAINTENANCE GENERAL LEVEL II

40 Contact Hours - Part-time Certificate Course

OVERVIEW:

This course enhances maintenance management skills. It targets specific maintenance techniques and provides methods for setting up maintenance programmes, including statistical process control.

PRE-REQUISITES

Successful completion of "IM General Level I"

Direct involvement in most aspects of maintenance and a good science background are desirable.

TARGET GROUP

Maintenance Personnel

Operators

Supervisors

Engineers

COURSE OUTLINE

- Safety
- Maintenance planning and analysis
- Performance measurements and machine efficiencies
- Trend analysis and failure predictability
- The production/maintenance dilemma; striking a happy medium
- Stock control, budgeting
- Work based project

EXPECTED OUTCOMES

On successful completion of this course participants will be able to:

1. Improve maintenance techniques and management.
2. Improve machine efficiency
3. Estimate Mean-time between failures and reduce unplanned shutdowns
4. Set up Just-in-time inventory systems
5. Use statistical methods for predicting and analyzing failure.
6. Perform root cause analysis.
7. Identify specific areas of improvement.

INDUSTRIAL MAINTENANCE GENERAL LEVEL I

40 Contact Hours- Part-time Certificate Course

OVERVIEW

This course covers the fundamental aspects of the maintenance of industrial equipment. It identifies maintenance techniques and introduces participants to failure diagnosis and prediction

PRE-REQUISITES

Direct involvement in most aspects of maintenance and a good science background are desirable.

TARGET GROUP

Maintenance Personnel
Operators
Supervisors
Engineers
Craftsmen

COURSE OUTLINE

- Safety
- Definition of maintenance and repairs
- Formal treatment of maintenance
- Troubleshooting methods and procedures
- Key indicators: definition, use, function and identification
- Use and function of standby and backup systems
- Introduction to cost and stock control
- Introduction to Electrical, Mechanical, Fluidics, Maintenance Welding and Refrigeration Systems
- Work based project

EXPECTED OUTCOMES

On successful completion of this course participants will be able to:

1. Apply new ideas and concepts of maintenance
2. Improve machine reliability.
3. Predict failures
4. Reduce spares inventory.
5. Reduce maintenance cost.
6. Identify specific maintenance techniques for general maintenance.
7. Perform failure diagnosis.