

**THE HONG KONG INSTITUTION OF ENGINEERS  
ENGINEERING GRADUATE TRAINING SCHEME “A”**

**MODEL TRAINING GUIDE**

**MANUFACTURING AND INDUSTRIAL ENGINEERING**

**Model Training Guide (MTG)**

The Model Training Guide is a guide to Companies on the practical experiences considered relevant in the formal training of potential Professional Engineers.

**Training Programme (TP)**

The Training Programme is the plan prepared by a Company which is designed to meet the experiences listed in the MTG and to meet the objectives set out in the Record of Objectives. This ‘plan’ is presented for approval on Form TD1 Part 2 as a part of the Assessment/Reassessment procedures.

**Training Period - Nominally 2 years**

The length of the training is based on meeting the objectives and not determined by time. The times shown below are indicators only of the time that a trainee would normally take to meet the relevant objectives.

**Training Aim**

It is important to note that the Scheme “A” Graduate Training is designed to be a fast track by which a graduate can obtain full professional status. The training therefore covers both Technical and Professional matters.

**Continuing Professional Development (CPD)**

An implicit part of the Scheme “A” training is related to CPD which should be an integral and relevant part of the development of the graduate trainee.

**Training Programme Content**

1. Introduction (suggest 1 week in total)
  - 1.1 Information about the company
    - (a) Size, history, subsidiaries (if any)
    - (b) Products and services, markets and competitors
    - (c) Management structure and functions
    - (d) Communication systems
    - (e) Location and layout of the facilities
    - (f) Safety and health
    - (g) Joint Consultation arrangements (if any)
  - 1.2 Information about training programme, prospects and career development

- (a) Training programme and objectives
- (b) Continuing Professional Development (CPD)
- (c) Obligation, discipline and career development
- (d) Relationship with HKIE, Engineering Supervisor, Tutor, and VTC (if appropriate)

2. Engineering Practice (minimum 8 months in total)

2.1 Engineering Practice Part 1 (minimum 4 months in total)

2.1.1 Basic Engineering Practice Workshop (minimum 1 month)

Knowledge and use of:

- (a) Hand/power tools and machine tools, and/or,
- (b) Industrial engineering tools to real life or simulated cases

2.1.2 Production Processes or Service Operations (minimum 2 months)  
[choose either 2.1.2.1 or 2.1.2.2]

2.1.2.1 Production Processes [At least 2 of the following]

- (i) Metal forming processes: e.g. rolling, forging, extrusion, drawing, wire drawing, blanking
- (ii) Foundry practice or powder metallurgy
- (iii) Casting
- (iv) Precision machining; e.g. CNC milling, CNC turning, shaping, EDM machining, jig grinding
- (v) Plastics processing: e.g. injection moulding, blow moulding, vacuum forming, rotational moulding, compression moulding, thermoset casting
- (vi) Joining of materials: e.g. gas and arc welding, brazing, soldering, ultrasonic welding, adhesive joining
- (vii) Heat treatment processes
- (viii) Surface treatment; e.g. chemical surface treatment, enamelling, vacuum metallizing, shot and sand blasting and/or metal spraying
- (ix) PCB production: e.g. PCB assembly, SMT processes, TAB bonding
- (x) I.C. fabrication processes: e.g. wafer sawing, die bonding.
- (xi) Automated/Mechanized processes: e.g. applications of pneumatic, electro-mechanical or hydraulic equipment
- (xii) Apparel manufacturing processes: e.g. pattern making, pattern grading, sewing

2.1.2.2 Service Operation [At least 2 of the following]

- (i) Planning and Scheduling
- (ii) Project handling and co-ordination

- (iii) Services level/capacity design
- (iv) Planned replacement & maintenance
- (v) Human factors e.g. shift work
- (vi) Inventory control
- (vii) Supplier evaluation
- (viii) Logistics and support
- (ix) Costing structure and measurement
- (x) Activity based costing
- (xi) Work design e.g. study & measurement

2.1.3 Quality, Measurement and Statistical Analysis (minimum 1 month)  
[At least 2 of the following]

- (a) Quality, Control Sampling Method
- (b) Statistical Process Control (SPC)/Statistical Quality Control (SQC)
- (c) Measurement e.g. use of measuring instruments
- (d) Design and implementation of database systems
- (e) Data/Information collection, treatment and analysis
- (f) Statistical analysis and practical recommendations
- (g) Measurement of systems performance

2.2 Engineering Practice Part 2 (minimum 4 months in total)

2.2.1 Associated Technical Activities (minimum 3 months)  
[choose either 2.2.1.1 or 2.2.1.2]

2.2.1.1 Manufacturing Systems [At least 4 of the following]

- (i) Design and development of process methods, work specification, workplace layout
- (ii) Production planning and control, work scheduling
- (iii) Quality assurance, statistical quality control systems
- (iv) Plant layout and materials handling
- (v) Inventory control
- (vi) Work study, job evaluation, rate fixing
- (vii) Information system design
- (viii) Research and development
- (ix) Product design
- (x) Tooling design
- (xi) Testing and commissioning of plant
- (xii) CAD/CAM/CAE
- (xiii) Use of materials e.g. types of materials available, properties and practical uses

2.2.1.2 Service System [At least 4 of the following]

- (i) Business process engineering and design
- (ii) Demand forecasting, operational planning and scheduling

- (iii) Information system design
- (iv) Services network and logistics design
- (v) Plant layout and process flow design
- (vi) Quality assurance of service systems
- (vii) Work study, job evaluation, rate fixing
- (viii) Motivation and incentive system
- (ix) Project planning and control
- (x) Testing and commissioning of plant and service
- (xi) Materials and supplies sourcing
- (xii) Reliability, maintenance and service engineering
- (xiii) EDI, E-Mail and Internet communication
- (xiv) Information system and/or management

2.3 Industrial Management and Commercial Activities (minimum 1 month)  
[At least 2 of the following]

- (a) Organization and methods
- (b) Training/Human resources management
- (c) Purchasing/supply management
- (d) Receiving and warehousing
- (e) Dispatch and transportation
- (f) Sales/marketing and business development
- (g) Plant engineering/maintenance
- (h) Logistics and support
- (i) Security of plant, product and service
- (j) Services product development and/or liaison with customers
- (k) Materials management e.g. materials sourcing, specification, requirement

3. Functional Specialist Training (minimum 8 months in total)  
[choose either 3.1 or 3.2]

3.1 Manufacturing Industry

This period should be spent in at least 3 or more of the following activities:

- (a) Process planning and design e.g. design and development of production processes including tooling up of production lines, plant layout, workplace design
- (b) Tooling design e.g. jig and fixture, metal dies, plastic moulds
- (c) Work study and wages systems
- (d) Management information systems
- (e) Production scheduling and control
- (f) Inventory control
- (g) Maintenance systems
- (h) CAD/CAM/CAE
- (i) JIT and/or set up time reduction projects
- (j) TQM/ISO 9000 project
- (k) Concurrent engineering
- (l) Health and safety, security and crime prevention
- (m) Environmental Engineering/ISO 14000

- (n) MRP II and/or ERP
- (o) Research & Developing
- (p) Product prototyping and development
- (q) Costing, estimating, purchasing and sales
- (r) Supply chain Management
- (s) Engineering Project Management

### 3.2 Services Industry

This period should be spent in at least 3 or more of the following activities:

- (a) Forecasting and planning
- (b) Operation scheduling and control
- (c) System performance design and evaluation
- (d) Work study/design
- (e) Wages and incentive systems
- (f) Inventory control
- (g) Maintenance systems
- (h) Management accounting and costing
- (i) Management information systems
- (j) Health and safety, security and crime prevention
- (k) Time and compression project
- (l) TQM/ISO 9000 project
- (m) Operations management
- (n) Strategic management
- (o) Value engineering
- (p) Environmental Engineering/ISO 14000
- (q) Electronic Commerce
- (r) Transportation logistics
- (s) System integration

#### 4. Objective Training (minimum 6 months in total)

This is training in any one or more of the activities outlined in (2) and (3), which leads to an initial appointment as an engineer. It should also aim to develop skills and knowledge needed to make an effective start. Special courses dealing with the particular technologies having a bearing on future work may be necessary during training. Where appropriate, computer applications should be considered at a priority.

#### **N.B.**

1. The minimum training period must not be less than 24 months.
2. The programme set out is for guidance only but substantial departure should not be made. Employers should endeavour to provide training to their trainees in as many areas as possible as is appropriate to the sector of employment.
3. This guide should be read in conjunction with Section 3 of the Membership Admission Requirements booklet.
4. During their training, each trainee is required to maintain a Graduate Training Log Book, CPD Logbook and Record of Objectives.