

Training Title STATIC AND DYNAMIC MEASUREMENTS & MEASURING FACILITIES

<u>Training</u> Duration 5 days

Training Venue and Dates

REF:	Static and Dynamic	5	13-17 July 2025	\$5,500	Cairo, Egypt.
IC063	Measurements & Measuring				
	Facilities				

Training will be held at any of the 4-5-star hotels. The exact venue will be informed later.

Training Fees

\$5,500 per participant for Public Training includes Materials/Handouts, tea/coffee breaks, refreshments & Lunch

Training Certificate

Define Management Consultancy & Training Certificate of course completion will be issued to all attendees.

TRAINING DESCRIPTION

This course provides a comprehensive understanding of static and dynamic measurement principles, technologies, and facilities used in industrial and laboratory environments. Participants will explore the theory and application of different measurement systems used to monitor physical parameters such as pressure, flow, temperature, force, and displacement in both steady-state and time-varying conditions.

The course also covers measurement standards, calibration techniques, uncertainty analysis, and the use of advanced instrumentation in real-world industrial settings, particularly in sectors where high measurement accuracy and reliability are critical.

TRAINING OBJECTIVES

By the end of the course, participants will be able to:

- Differentiate between static and dynamic measurements and identify their industrial applications
- Understand the behavior of measurement systems under steady and varying conditions
- Select appropriate instruments and sensors for specific applications
- Apply calibration techniques and uncertainty analysis to measurement systems

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1



- Design or evaluate measurement setups and facilities for performance and compliance
- Interpret measurement data and troubleshoot measurement system error

TRAINING METHODOLOGY

A highly interactive combination of lecture and discussion sessions will be managed to maximize the amount and quality of information, knowledge and experience transfer. The sessions will start by raising the most relevant questions, and motivate everybody finding the right answers. The attendants will also be encouraged to raise more of their own questions and to share developing the right answers using their own analysis and experience.

All attendees receive a course manual as a reference.

This interactive training workshop includes the following training methodologies

30% Lectures 30% Workshops and work presentation 20% Group Work& Practical Exercises 20% Videos& General Discussions

WHO SHOULD ATTEND

This course is ideal for:

- Instrumentation & Control Engineers
- Measurement Technicians and Lab Personnel
- Maintenance and Operations Engineers
- Process Engineers and Quality Specialists
- Calibration and Metrology Technicians

COURSE OUTLINE

<u>Day 1:</u>

Fundamentals of Measurement

- Module 1: Introduction to Measurement Principles
 - Purpose and importance of measurement in engineering
 - Definitions: accuracy, precision, resolution, sensitivity, range
 - Static vs. dynamic measurements overview

• Module 2: Measurement System Components

- Sensors and transducers
- Signal conditioning devices
- Data acquisition systems (DAQ)
- Analog vs. digital measurement systems

<u>Day 2:</u>

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Static Measurements

• Module 3: Static Measurement Techniques

- Characteristics of static systems
- Steady-state pressure, temperature, flow, level, and displacement measurements
- Sensor selection criteria for static applications
- Module 4: Calibration of Static Systems
 - Calibration procedures and standards (ISO/IEC 17025, NIST)
 - Manual vs. automated calibration
 - Reference instruments and traceability
 - Practical exercise: static calibration process

<u>Day 3:</u>

Dynamic Measurements

- Module 5: Understanding Dynamic Behavior
 - First and second-order system response
 - Transient vs. oscillatory inputs
 - System lag, damping, bandwidth, and rise time
- Module 6: Dynamic Measurement Techniques
 - Measurement of vibration, pulsation, dynamic pressure, and temperature
 - High-speed data acquisition
 - Filtering and signal processing techniques
 - Sensor considerations for dynamic applications

<u>Day 4:</u>

Error, Uncertainty, and Data Interpretation

- Module 7: Measurement Errors and Uncertainty
 - Types of measurement errors (systematic, random, gross)
 - Uncertainty estimation and propagation
 - Statistical analysis in measurement
- Module 8: Data Logging and Analysis
 - Logging tools and software
 - o Time-series analysis and FFT for dynamic data
 - Case studies: interpreting measurement results

<u>Day 5:</u>

Measuring Facilities and Applications

• Module 9: Design and Operation of Measuring Facilities

DMCT/OL/9/18(Rev3Dt:23/9/18)



- Flow loops, calibration benches, test rigs
- o Environmental control for lab vs. field measurements
- Safety considerations in high-pressure/high-temperature testing

• Module 10: Industry Applications and Case Studies

- Oil & gas custody transfer systems (static flow metering)
- Rotating equipment monitoring (dynamic vibration and pressure)
- Laboratory vs. field measurement challenges

NOTE:

Pre & Post Tests will be conducted

<u>Case Studies, Group Exercises, Group Discussions, Last Day Review & Assessments will</u> <u>be carried out.</u>



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