



## CQE Training & Consultancy Plt (Reg. No. : LLP 0003668 LGN)

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# METROLOGY, MEASUREMENT & CALIBRATION (PUBLIC / IN-HOUSE TRAINING PROGRAMME)



## INTRODUCTION

This course addresses the formal requirements and establishment, control and maintenance of measurement and calibration systems to meet the requirements of the ISO9001, IATF16949, ISO22000, ISO13485 and HACCP standards including the Quality Assurance Requirements for Measuring Equipment of the ISO10012:2003 and NIST, USA. In this highly interactive session, there would be a balance of lectures, workshops and exercises.

## LEARNING OUTCOMES/OBJECTIVES

Upon return to workplace, participants will be able to:-

- Appraise the company's measurement & calibration systems ;
- Develop an in-house cost effective measurement & calibration programme ;
- Statistically extend or reduce calibration frequencies of equipment to maximize programme effectiveness ;
- Initiating measurement & calibration cost down programmes.

## CONTENTS

### DAY 1

#### ● Measurement Concepts and Systems

- ✚ Introduction to Metrology
  - Purpose and terminology
  - Statistical properties of measurement systems
  - Standards
  - General guidelines



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- Selecting / developing test procedures
- Procedures for assessing measurement system
  - \* Measurement issues
  - \* Types of measurement system variation – Bias, Repeatability, Reproducibility, Stability and Linearity
- ✚ Types of Measurements
- ✚ Measurement Standards
- ✚ Exercise

- **The Requirements of ISO 9001 and IATF16949 Standard**
- **The Differences between AIAG MSA Manual 3<sup>rd</sup> Edition and 4<sup>th</sup>. Edition**
- **The Quality Assurance Requirements of the ISO10012:2003 and NIST**

### **DAY 2**

- **Determination of Measurement Errors**
  - ✚ Measurement Uncertainty
  - ✚ Measurement Tolerance
  - ✚ Permissible Error
  - ✚ Confidence in Measurement
  - ✚ Exercise
- **Measurement Operating Procedures**
  - ✚ Development of Measurement & Calibration Systems
  - ✚ Development of Working Procedures including Traceability Chain
  - ✚ Management and Maintenance of Measurement & Calibration Systems
  - ✚ Cost Improvement Techniques / Programmes
  - ✚ Group Discussion
- **Gage Repeatability & Reproducibility (GR&R)**
  - ✚ Introduction & its purpose
  - ✚ Short Method
  - ✚ Exercise #1
  - ✚ Long Method
  - ✚ Exercise #2



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### ● Case Study & Exercises

- ✚ Concepts
- ✚ Practices

## TRAINING METHODOLOGY

The program would be conducted by using the following materials / aids:-

- ✚ Course Note
- ✚ LCD / OHP
- ✚ Group Activities / Workshop
- ✚ Lecturettes

## DURATION

2 Days

## PARTICIPANTS

This programme is designed for all levels of management and employees who are involved in Inspection, Measuring, Testing and Calibration activities.

