Measurement and Quality Control (Imperial)

Catalogue Number	8014-0001
Category	Quality Control
Duration	15 Hours

Activity 1: Getting Started

- Quality Control
- Units
- Handling and Care of Measurement Tools
- Task: Converting Dimensions
- Task: Clean and Return Tools

Activity 2: Accuracy, Precision and Measurement Tools

- Inspection and Measurement/ Quality Control Toolkit
- Review of Measuring Tools
- Measurement Accessories
- Accuracy and Precision
- Reliability

Activity 3: Units of Measurement and Conversion

- Imperial System vs. Metric System
- The Metric System
- The English / Imperial System
- Conversion Table
- Task: Measuring a Piece of Paper
- Task: Calculating the Area and Volume of a Piece of

Activity 4: Fractions, Decimals, and Rounding

- Fractions vs. Decimals
- Task: Converting Measurements
- Significant Figures
- Task: Conversion
- Rounding

Activity 5: Scaled Measurement Tools

- Scaled Measurement Tools
- Common Measurement Errors
- Task: Demonstrating Parallax
- Common Measurement Errors: Origin Error
- Scaled Measurement Tools: Tape Measure
- Task: Measuring Outside Dimensions
- Steel Rules
- Task: Measuring Using the Different Zero
- Steel Protractor

Activity 6A: Vernier, Dial, and Digital Calipers

- Slide Calipers
- Vernier Calipers
- Dial Calipers
- Electronic Digital Calipers
- Cleaning the Outside Jaws of a Caliper
- Task: Setting Zero on Dial Calipers
- Task: Setting Zero on Digital Calipers (For Use with Hardware)
- Relative Measurements
- Task: Measuring the Dimension of a Plug Gauge
- Task: Measuring the Inside Dimension of the Capped Pipe
- Task: Measuring the Inside Diameter and Outside Diameter
- Measuring a Depth Dimension
- Task: Measuring a Depth Dimension of the Capped Pipe
- Task: Measuring a Step Dimension

Activity 6B: Caliper Hardware Tasks

- Task: Setting Zero on Dial Calipers (For Use with Hardware)
- Task: Measuring the Dimension of a Plug Gauge (For Use with Hardware)
- Task: Measuring the Inside Dimension of the Capped Pipe (For Use with Hardware)
- Task: Measuring the Inside Diameter and Outside Diameter (For Use with Hardware)
- Task: Measuring a Depth Dimension (For Use with Hardware)
- Task: Measuring a Step Dimension (For Use with Hardware)

Activity 7: Micrometers

- Micrometers
- Working with Micrometers
- Taking Measurements with a Micrometer
- Cleaning the Outside Jaws of a Micrometer
- Task: Measuring an Outside Dimension with a Micrometer
- Task: Measuring an Outside Dimension with a Micrometer (For Use with Hardware)
- Task: Measuring a Small Curved Object with a Micrometer
- Measuring a Small Curved Object with a Micrometer (For Use with Hardware)
- Task: Comparing Accuracy of Calipers vs. Micrometers
- Task: Comparing Accuracy of Calipers vs. Micrometers (For Use with Hardware)

Activity 8: Height Gauges and Dial Indicators

- Height Gauges
- Surface Plates
- Task: Measuring Depth and Height Using a Height Gauge
- Task: Measuring Depth and Height Using a Height Gauge (For Use with Hardware)
- Task: Measuring a Notch on a Bracket
- Task: Measuring a Notch on a Bracket (For Use with Hardware)
- Dial Indicators
- Dial Height Indicators
- Task: Measuring a Close Tolerance Dimension
- Task: Measuring a Close Tolerance Dimension (For Use with Hardware)

Activity 9: Fixed Gauges

- Fixed Gauges
- Plug Gauges
- Using Plug Gauges to Fixture Parts
- Finding the Center of a Hole with a Plug Gauge
- Task: Measure the Size and Location of the Holes in the Bracket
- Task: Measure the Size and Location of the Holes in the Bracket (For Use with Hardware)
- Gauge Blocks
- Task: Using a Gauge Block to Precisely Measure a Feature
- Task: Using a Gauge Block to Precisely Measure a Feature (For Use with Hardware)
- Accuracy of Gauge Block vs. Accuracy of Height Gauge

Activity 10: Measuring Pressure and Flow Rate

- Pressure
- Increasing Contact Area and Reducing Pressure
- Measuring Pressure
- Pressure Gauges
- Measuring Power in a Hydraulic System
- Flow Meter

Activity 11: Transfer Measurement Tools

- Transfer Measurement Tools
- Outside Calipers
- Use of Outside Calipers
- Task: Developing a Feel for Using an Outside Caliper
- Task: Developing a Feel for Using an Outside Caliper (For Use with Hardware)
- Inside Calipers
- Use of Inside Calipers
- Task: Developing a Feel for Using an Inside Caliper
- Task: Developing a Feel for Using an Inside Caliper (For Use with Hardware)
- Sources for Error in Caliper Measurements
- Dividers
- Small Hole Gauges
- Telescoping Hole Gauges

Activity 12: Statistical Analysis

- Statistics
- Mean
- Median
- Standard Deviation
- Application of Standard Deviation to a Population
- Sample Size
- Application of Statistics in Manufacturing
- Calculating the Mean for the Manufacturing Example
- Calculating the Extreme Spread
- Preliminary Conclusion for the Manufacturing Example

Activity 13: Statistical Process Control

- Using Software for Statistical Analysis
- Normal Distribution
- Software and Gauges
- Task: Using the SPC Software for Statistical Analysis
- Task: Using the SPC Software for Statistical Analysis (For Use with Hardware)

Activity 14: Nominal Dimensions and Tolerance

- An Engineering Drawing
- Task: Identifying Components of an Engineering Drawing
- Nominal Dimensions
- Tolerances
- Analyzing an Engineering Drawing
- Under Lower Limit and Over Upper Limit
- Tolerances and Fits
- Filling Out an Inspection Sheet - Walkthrough

Activity 15: Parts Inspection and Inspection Reports

- Completing an Inspection
- Inspection Reports
- How an Inspection Report is Completed
- Dim Numbers
- Task: Inspection of Dimension (Dim) 19
- Task: Inspection of Dimension (Dim) 19 (For Use with Hardware)
- Task: Completing an Inspection Sheet

Activity 16: Conclusion

- Quality Control in Industry
- Additional Fixturing and Measurement Tools
- Sine Bars and Sine Plates
- 1-2-3 Blocks
- V-Blocks
- In-Process Inspection and Custom Fixtures and Gauges
- Optical Comparator and Shadowgraph
- Coordinate Measuring Machine (CMM)
- Electronic Optical Inspection
- 3D Scanning
- Laser Scanning