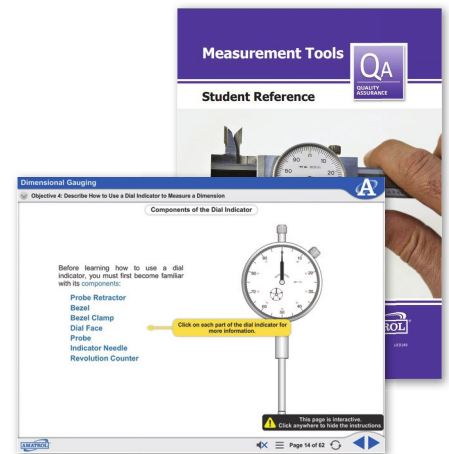


Portable Measurement Tools Learning System

990-MES1



990-MES1



Interactive Multimedia Curriculum and Student Reference Guide

Learning Topics:

- Basic Measurement
- Tape Measurement
- Measurement Conversion
- Precision Measurement Tools
- Dial Caliper
- Digital Caliper
- Micrometers
- Dimensional Gauging
- Indicator Measurement
- Data Collection

Amatrol's Portable Measurement Tools Learning System (990-MES1) introduces the fundamental principles of measurement including basic measurement, precision measurement, direct gauging, indirect gauging, and dimensional measurements using both the U.S. customary system as well as S.I. metric system. Understanding how to perform accurate measurements is relevant to technical careers such as quality control inspector, machinist, manufacturing engineer, operations manager, and production technician. The 990-MES1's compact size and durable case also provide for safe storage when available training space must be used to teach other topics.

The 990-MES1 allows learners to apply fundamental measurement principles using industry-standard tools like dial calipers, micrometers, and dial indicators to achieve accurate measurements that are essential to any technical career. Learners will acquire skills such as how to measure length, accurate measurement of inside and outside dimensions, measuring both in U.S. Customary and S.I. Metric units, and collecting measurement data. The 990-MES1 contains precisely-machined and numbered parts that challenge the learner to make accurate measurements. The measurement tools and parts were carefully selected to not only teach the learner how to use the tools properly, but to also teach them the proper application for their use.



Technical Data

Complete technical specifications available upon request.

Portable Case

ABS Plastic
20.90-in. L x 12.90-in. W x 8.40-in. D

6-in. Dial Caliper

Digital Calipers w/ USB communication

USB Cable for Digital Calipers

SPC Data Management Software

0-25 MM Micrometer

3-4-in. Micrometer

Dial Indicator

Tape Measure

Metric Metal Rule

6-in. Metal Rule

Metal Decimal Rule, 50th Scale

Variable Diameter Metal Discs (3)

Metal Squareness Plates (3)

Metal Shafts (10)

Small Hole Gauges (4)

1-2-3 Block

Multimedia Curriculum (N19149)

Instructor's Guide (C19149)

Installation Guide (D19149)

Student Reference Guide (H19149)

Additional Requirements:

Computer: See <http://www.amatrol.com/support/computer-requirements>

Gain Skills Used By Production Technicians, Machinists, and More!

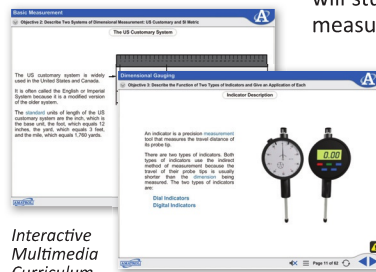
The 990-MES1 uses industry-standard measurement tools used for various technical career paths including manufacturing, engineering, science, and medical technology. This learning system includes dial and digital calipers, micrometers, steel rules, dial indicator with magnetic base, a gauge block, and small hole gauges. Additional measurement components, such as rectangular plates, shapes of varying dimensions, and disks with machined lips are used to help learners use measuring devices to gain hands-on practice and skills.



Just to name a few specific measurement skills that learners will develop, the 990-MES1 teaches converting between U.S. customary units and SI metric units, measuring the outside dimension of a part using a micrometer, calibrating a dial caliper, mastering a dial indicator, collecting and displaying data using data acquisition software, histogram creation and analysis, control chart creation and analysis, and geometric dimensioning and tolerancing.

Highly-Interactive Multimedia for Measurement Skill-Building

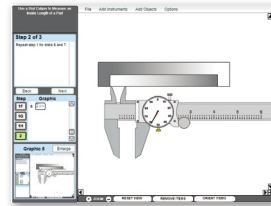
The 990-MES1 features comprehensive measurement curriculum to teach the theoretical knowledge necessary to understand more advanced topics and applications. Within this curriculum, learners will study topics such as: stating the typical accuracy of a dial caliper measurement and explain what affects it; using an outside micrometer graduated in English units to measure the outside dimension of a part; and describing the function of a gauge fixture. This curriculum is presented in a stunning, interactive multimedia format. Each topic's presentation includes extensive videos, 3D animations, interactive exercises, and colorful graphics that will motivate students and help them learn more effectively.



Interactive Multimedia Curriculum

Collect Real-Time Data with Data Management Software

The 990-MES1 includes Amatrol's Data Management software. This software is a Windows-based program that collects data in real-time from digital gauges. Learners will study different ways to collect data and then apply software to improve it.

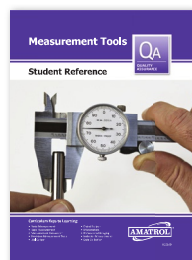


Virtual Trainer for Online Measurement Skill-Building

The Portable Measurement Tools Training System also features a virtual multimedia trainer! Amatrol's virtual trainers replicate hands-on equipment in such great detail that learners will feel like they are using the actual equipment. Learners will perform essentially the same tasks using virtual trainers that they would perform using equipment hardware. Transition from theory to hands-on is a seamless process.

Practice Measurement Skills Anywhere, Anytime!

Learners only need a small amount of desk space and a computer to study vital measurement-related industry skills. Its compact size and durable, hand-held case provide for safe storage when your limited space must be used for teaching other subjects when the measurement training system must be transported to a different location in the facility for use.



Student Reference Guide

A sample copy of the Portable Measurement Tools Student Reference Guide is included with the learning system. Sourced from the multimedia curriculum, the Student Reference Guide takes the entire series' technical content contained in the learning objectives and combines them into one perfectly-bound book. If you would like to inquire about purchasing additional Student Reference Guides for your program, contact your local Amatrol Representative for more information.



PORTABLE MEASUREMENT TOOLS LEARNING SYSTEM

This learning system shall introduce the fundamental principles of measurement including basic measurement, precision measurement, direct gauging, indirect gauging, and dimensional measurements using both the U.S. customary system as well as S.I. metric system. This learning system requires a computer. It shall include the following:

Portable Case

- ABS Plastic
- 20.90-in. L x 12.90-in. W x 8.40-in. D

Measurement Components

- 6-in. Dial Caliper
- Digital Calipers w/ USB communications
- USB Cable for digital calipers
- SPC Data Management Software
- 0-25 MM Micrometer
- 3-4-in. Micrometer
- Dial Indicator
- Tape Measure
- Metric Metal Rule
- 6-in. Metal Rule
- Metal Decimal Rule, 50th scale
- Variable Diameter Metal Discs (3)
- Metal Squareness Plates (3)
- Metal Shafts (10)
- Small Hole Gauges (4)
- 1-2-3 Block

Student Curriculum

The student curriculum shall consist of (1) set of three (3) multimedia modules with at least eighteen (18) industry skills. Major topic areas include: tape measurement, measurement conversion, precision measurement tools, dial caliper, digital caliper, micrometers, dimensional gauging, indicator measurement, and data collection.

The student curriculum shall be designed in a skill-based format that focuses on teaching industry-relevant tasks. The objectives shall be accomplished by organizing the learning material into two multimedia courses, which are further subdivided into three or more segments per module. All learning material needed shall be contained in the modules including text material, laboratory equipment activities, and multimedia directions. No external text sources shall be required. The specific cognitive skills taught by each text passage shall be identified next to the passage. Each lab activity shall be identified by the industrial task taught. All activities shall be highly detailed with step-by-step instructions to facilitate a self-directed learning environment. A combination of step-by-step enabling activities and creative, problem-solving activities shall be provided. A self-review of five to ten questions shall be provided after each segment. The curriculum must be capable of both self-directed and instructor directed study. All activities must correlate directly to the hardware supplied, with detailed illustrations and diagrams.

In addition to multimedia curriculum, this learning system includes access to Virtual Trainer skill-building. The curriculum shall include three (3) interactive multimedia modules with at least eighteen (18) measurement industry skills. Major topics include: basic measurement tools, precision measurement tools, and dimensional gauging. This software shall be provided as a one seat license or in multiples as required.

Teacher's Assessment/ Portfolio Guides

A teacher's guide shall be provided. It shall contain student data sheets, data sheet solutions, self-review answers, quizzes, quiz answers, student skill record sheets, and authentic assessment. A quiz shall be provided for each packet. A question shall be provided in each quiz for each cognitive objective taught. All tasks listed in the packet shall be listed on personalized student record sheets. The Instructor's Package shall include directions for authentic skill assessment.

Amatrol Model No. 990-MES1 or equal

990-MES1
PORTABLE MEASUREMENT TOOLS
LEARNING SYSTEM

MODULE 1 BASIC MEASUREMENT

SEGMENT 1	SI MEASUREMENT
OBJECTIVE 1	Define dimensional measurement and explain its importance
OBJECTIVE 2	Describe two systems of dimensional measurement: U.S. Customary and SI Metric
ACTIVITY 1	Identification of quality assurance workstation components
OBJECTIVE 3	Describe the function and construction of a machinist's rule
OBJECTIVE 4	Describe how to use a metric machinist's rule
SKILL 1	Use a metric machinist's rule to measure an outside length of a part
SEGMENT 2	U.S. CUSTOMARY MEASUREMENT
OBJECTIVE 5	Define measurement accuracy and explain its importance
OBJECTIVE 6	Define resolution and explain its effect on accuracy
OBJECTIVE 7	Describe how to use a decimal-inch machinist's rule
SKILL 2	Use a decimal-inch machinist's rule to measure a length
OBJECTIVE 8	Describe how to use a machinist's rule with a common fraction-inch scale
SKILL 3	Use a machinist's rule graduated in common fractions of an inch to measure a dimension
SEGMENT 3	TAPE MEASURE
OBJECTIVE 9	Describe the function and construction of a tape measure
OBJECTIVE 10	Describe how to use a tape measure to measure a length
SKILL 4	Use a tape measure to measure a length
OBJECTIVE 11	Describe four sources of measurement error
SEGMENT 4	MEASUREMENT CONVERSION
OBJECTIVE 12	Describe how to convert measurements made in common fractions to decimal inches
SKILL 5	Convert between common fractions and decimal inches
OBJECTIVE 13	Describe how to convert measurements between the U.S. Customary system and the SI Metric system
SKILL 6	Convert between U.S. Customary units and SI Metric units

MODULE 2 PRECISION MEASUREMENT TOOLS

SEGMENT 1	DIAL CALIPER
OBJECTIVE 1	Describe the function of a precision measurement tool and give an example
OBJECTIVE 2	Describe the function of a dial caliper and give an application
OBJECTIVE 3	Describe how to use a dial caliper
ACTIVITY 1	Dial caliper operation
SKILL 1	Calibrate a dial caliper
SKILL 2	Use a dial caliper to measure an outside dimension of a part
SKILL 3	Use a dial caliper to measure an inside dimension of a part

OBJECTIVE 4	State the typical accuracy of a dial caliper measurement and explain what affects it
SEGMENT 2	DIGITAL CALIPER
OBJECTIVE 5	Describe the function of a digital caliper and give an application
OBJECTIVE 6	Describe how to use a digital caliper
ACTIVITY 2	Digital caliper operation
OBJECTIVE 7	State the typical accuracy of a digital caliper and explain what affects it
SKILL 4	Use a digital caliper to measure an outside dimension of a part
SKILL 5	Use a digital caliper to measure an inside dimension of a part
SEGMENT 3	ENGLISH MICROMETER
OBJECTIVE 8	Describe the function of a micrometer and give an application
OBJECTIVE 9	Describe how to use an outside micrometer
ACTIVITY 3	Micrometer operation
SKILL 6	Use an outside micrometer graduated in English units to measure the outside dimension of a part
SEGMENT 4	METRIC MICROMETER
SKILL 7	Use an outside micrometer graduated in Metric units to measure the outside dimension of a part
SKILL 8	Use a micrometer to measure the outside diameter of a cylindrical part
OBJECTIVE 10	State the typical accuracy of an outside micrometer and explain what affects it
ACTIVITY 4	Analysis of measurement

MODULE 3 DIMENSIONAL GAUGING

SEGMENT 1	INTRODUCTION TO GAUGING
OBJECTIVE 1	Define a tolerance and explain its importance
OBJECTIVE 2	Describe the function of two methods of gauging and give an application of each
OBJECTIVE 3	Describe the function of two types of indicators and give an application of each
OBJECTIVE 4	Describe how to use a dial indicator to measure a dimension
ACTIVITY 1	Dial indicator operation
SEGMENT 2	INDICATOR MEASUREMENT
OBJECTIVE 5	Describe the function of a gauge block
ACTIVITY 2	1-2-3 gauge block inspection
OBJECTIVE 6	Describe the function of mastering
SKILL 1	Master a dial indicator
SKILL 2	Measure a dimension using a dial indicator
OBJECTIVE 7	Describe how to use a digital indicator to measure a dimension
OBJECTIVE 8	Describe the function of a gauge fixture and give an application
SEGMENT 3	DATA COLLECTION
OBJECTIVE 9	Describe three ways to collect process data and give an advantage of each
SKILL 3	Collect and display data using data acquisition software
SKILL 4	Delete a file