

Functional Gaging and Measurement Workshop

(Based on ASME Y14.5, Y14.5.1, Y14.43 and Various B89 Standards)

Course Developer: Alex Krulikowski, President of Effective Training Inc. (ETI)



Learn geometric dimensioning and tolerancing from the experts. One of ETI's qualified instructors will come to your site to conduct a hands-on workshop on GD&T fundamentals. We provide training at locations around the world, and all of our workshops can be customized to include your drawings and parts.

ETI's training and materials were developed by Alex Krulikowski, the noted GD&T educator, author, and consultant. He has a degree in industrial vocational education and more than 30 years of industrial experience putting GD&T to practical use on the shop floor. Alex is a member of the ASME Y14.5 Committee on Dimensioning and Tolerancing and served as chairman of the Y14.41 Committee on Solid Model Dimensioning for six years, so he's an expert on how to teach GD&T's application as prescribed by the standards. He has helped more than 60,000 students learn GD&T through his textbooks, self-study courses, computer-based training software, and online learning center.

Learning to interpret and apply GD&T properly will help you and your company:

- Save money at the design stage
- Enable global sourcing
- Reduce drawing errors
- Increase productivity
- Increase part tolerances
- Assure that mating parts will assemble
- Eliminate scrap
- Improve inspection accuracy

About the Course

This 2-day workshop includes an introduction to functional gaging design and how to verify part dimensional requirements using functional gages and other measurement methods. The course is based on ASME Y14.5, Y14.5.1, Y14.43, and various B89 standards.

Who Should Attend

This workshop is a valuable tool for individuals who inspect parts, create inspection plans, or approve inspection methods. Typical attendees include CMM operators, inspectors, gage designers, manufacturing engineers, technicians, supplier quality engineers.

Workshop Highlights

The workshop focuses on inspection techniques for first article or fitness for use verification, including:

- How to make a working sketch of a functional gage
- Identifying the appropriate tools for verifying each geometric control
- Improving quality and efficiency through a proper verification of engineering requirements
- CMM measurement strategies

Skill Level Needed

- Familiarity with reading engineering drawings
- A good understanding of GD&T based on ASME Y14.5
- Familiarity with common inspection methods and tools from the four categories of inspection equipment (i.e. functional gages, open set-up inspection, CMM basics, calipers, micrometers, height gages, shadowgraph, etc.)

Each workshop participant receives:

- Inspection and gaging workshop exercise workbook
- Class handouts
- An official certificate of completion



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Quantity discounts available. Call 1-800-886-0909 to enroll today.

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Course Topics

Functions of Inspection in an Organization

Quality and quality manual
Metrology and metrologists
Inspection and the role of an inspector

Measurement Uncertainty

Definition / importance / terms / contributors to
Type A and type B uncertainty
Decision rule
Guard band, simple acceptance, simple rejection
Effect on product costs

Measurement/Inspection Plans

The dimensional measurement plan (DMP)
Purposes/importance/inputs/creating a DMP
Critical characteristic

Three Major Categories of Inspection Tools

Tools from each major category
Basic operating principles of attribute gage, variable measurement, algorithmic measurement

Attribute Gaging Design and Use Principles

Function and use / Y14.5 and Y14.43
Gagemakers' tolerances/tolerance stack-ups
Functional gages, referee gaging, gage principles
Absolute, tolerant and optimistic methods

Purpose and Contents of Inspection Reports

Five requirements
Standards and methods
Drawing mark ups
Non-conformance reports

All of our workshops can be customized to include your drawings and parts.

Inspecting and Reporting Size Dimensions

Y14.5 requirements for feature of size
Rule #1 and size dimensions
Inspecting MMC and LMC size limits and inspection results
Size inspection methods
Reporting MMC/LMC size inspection results

Simulating Datums for Inspection

Y14.5 datum requirements
Effects of datum sequence on inspection
Candidate datum set from Y14.5.13
Simulating datum planes, reference frames, and axes
Functional fixtures and CMMs
Functional gages, CMMs and datum shift

Verifying Form, Orientation, Location Control Requirements

Y14.5 requirements
Open set-up methods and CMMs
Using attribute gages
Measurement inaccuracies

Visit our website or email sales@etinews.com to learn more details about our courses.

- Applications of GD&T (ASME Y14.5M-1994) - **New!**
- ASME Y14.5M-1994-2009 Update - **New!**
- ASME to ISO Standards Comparison
- Engineering Drawing Requirements - **Exclusively from ETI!**
- Executive Overview of GD&T - **Exclusively from ETI!**
- Functional Gaging and Measurement (Y14.5, Y14.5.1, Y14.43) - **New!**
- GD&T Advanced Concepts of GD&T (ASME Y14.5M-1994)
- GD&T Fundamentals (ASME Y14.5M-1994)
- GD&T Fundamentals for Inspectors (ASME Y14.5M-1994) - **New!**
- GD&T Overview Workshop (ASME Y14.5M-1994) - **Exclusively from ETI!**
- ISO Geometrical Tolerancing - **New!**
- Solid Model Tolerancing: The ASME Y14.41 Standard - **Exclusively from ETI!**
- Statistical Tolerance Stacks - **Exclusively from ETI!**
- System Approach to Component Tolerancing - **Exclusively from ETI!**
- Tolerance Stacks (concept driven)



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