Geometrical Tolerancing to ASME standards – Level 1 - Course Synopsis

Scope

Geometric **D**imensioning and **T**olerancing **(GD&T)** is the common, powerful language of industrial manufacturing. GD&T is recognized around the world as the only way of defining engineering drawings and CAD models efficiently and unambiguously. But the unfortunate reality is that most of the workforce that engages with mechanical drawings has an adequate understanding of this language. Many individuals and organizations get by for some time before costly or otherwise painful experiences convince them they need to improve their skills in use of GD&T.

The truth is that properly applied at the earliest stages of a product development project, GD&T can establish robust product quality, save months of development time, tens even hundreds of thousands of euros, and potentially millions over the lifecycle of a product.

GD&T training has real benefits: lower costs, less non-conforming parts, higher tolerances.

InQuality, authorized partner of HEXAGON MI, offers on-site and on-line GD&T training courses.

Based on the latest ISO & ASME standards, our courses are tailor-made to fully cover your particular needs.

Aims & Objectives

The course is delivered as an intensive, three-day programme that covers the fundamental concepts of geometrical tolerancing to ASME standards and its application and interpretation.

Participants will discover how the system of geometrical tolerancing works, find out how to annotate and interpret drawings correctly, learn how different types of tolerance control different characteristics and how to choose the right tolerance for their application.

The course includes extensive classroom discussions, team exercises and problem-solving sessions. Examples of drawings or components from the client, where available, are used in order to illustrate the course material. Suggestions to customize the course to specific participant needs can be discussed.

To maximize the effectiveness of the training, an upper limit to the class size of 10 delegates is recommended.

Who it may concern

Design, development, manufacturing, assembly and quality engineers, CMM and CNC programmers, tool designers, toolmakers, technicians, and inspectors. In short anyone who creates, reads or edits mechanical part drawings and models.

Course topics

- Standards in context

      the current ASME Y14.5:2018 standard; relevance and major changes since 2009 or earlier

      ASME (GD&T) *vs.* ISO (GPS) and relevant national standards, future developments

- What is Geometrical Tolerancing?

      benefits and advantages of Geometrical Tolerancing

      major pitfalls of traditional coordinate tolerancing and how to overcome them

- Features and Features-of-Size, regular and irregular, Rule #1

- Linear size tolerances

- Datum and datum systems

what is a datum? datum *vs.* datum features, datum targets, simulated and compound datum

selection of datum features and controlling 6 degrees of freedom

indicating datums on drawings, annotation and symbology

- Tolerance frames

tolerance features & symbols, tolerance frame modifiers, Rule #2

3D-CAD Model Based Annotation (MBD) *(as per ASME Y 14.41:2019)* and 3D-PMI

- Basic dimensions *(BSs)*
- Tolerance characteristics *(what do they really control? SLOF)*

location, orientation, form and run-out tolerances

profile tolerances, unequally disposed profile tolerance

- Finding your way through the system – how to choose which tolerance characteristic to use
- Simple Clearance Fits

worst Case Boundaries, virtual Condition & Virtual Size

size datum features (RMB), and size datum features (MMB)

Maximum Material Requirement and Bonus Tolerance

The Trainer

Georgios Kaisarlis, Ph.D., M. Eng., has more than 20 years of teaching and working experience in the fields of Geometrical Dimensioning and Tolerancing (GD&T), precision manufacturing and industrial dimensional metrology. His long industrial experience comes from his career as a field engineer for the Hexagon MI group and his involvement as lead engineer in numerous specialized technical projects for the manufacturing industry *(reverse engineering, dimensional metrology, product design and development).* He has delivered several hundreds of GD&T and dimensional metrology classes for a variety of manufacturing clients throughout Europe and the Middle East.

Dr Kaisarlis is serving as appointed Technical Expert (WG2/WG10/WG17/WG18) and as accredited national delegate (ELOT/NQIS) in ISO TC/213 *"Dimensional and geometrical product specifications and verification".* ISO TC/213 is responsible for the international ISO standards relating to Geometrical Product Specification and Geometrical Tolerancing. He currently holds a research and teaching assistant's position in the School of Mechanical Engineering of the National Technical University of Athens (NTUA), Greece. Dr Kaisarlis holds a M. Eng. Degree in Mechanical Engineering from TU Athens (NTUA) since 1997 and a Ph.D. degree from the same University since 2007.