Geometrical Tolerancing to ISO standards – Level 2 - Course Synopsis

Aims & Objectives

The course is delivered as an intensive, two-day programme that covers some of the more advanced concepts of geometrical tolerancing to ISO standards and their application and interpretation.

Participants will discover how the functional specifications can be captured with the syntax of the tolerancing standards and how to choose the most effective tolerancing scheme for their application and process, will be able to define more advanced datum structures and to understand how to use the Maximum Material Condition modifier with datum references *(datum shift)*.

This highly-interactive 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

Anyone who is responsible for specifying, and interpreting, technical documentation: mechanical engineers, designers, managers, production planners, inspectors, machinists etc.

Since this is an advanced level course, students should have completed the Level-1 GD&T course, or equivalent, in order to comprehend the advanced level concepts.

Course topics

- Recap and Review of Level 1 course material
  - guidelines for working with Geometrical Tolerances
  - navigating through the GPS *(Geometrical Product Specification)* method
- Association
  - datum and datum feature: default and non-default association criteria for defining datums
- Filtration
  - ISO GPS 16610 filtration standard series for profiles *(open and closed)* and surfaces
  - the use of profile and areal filters in various applications
- Linear size tolerances
  - default and non-default size definitions *(ISO 14405-1:2016 & -2:2018)*, the use of modifiers
- Datums *(as per ISO 5459:2011 and ISO/DIS 5459.2:2017)*
  - situation features, identifying situation features on drawings
  - common datums based on aligned and non-aligned datum features
  - datums based on groups of datum features, complex surfaces and on contacting features
  - moving datum targets
- Understanding, creating and relating a Datum system to a part
- The tolerance hierarchy
  - how and when location and orientation tolerances control form directly and indirectly
- Combination of size and geometrical tolerances *(as per ISO 2692:2021)*
  - review of Maximum Material Requirement applied to tolerance values, bonus tolerance
  - maximum Material Requirement applied to datums, 'datum shift'

virtual condition boundaries, datums based on Virtual Condition boundaries

- Least Material Requirement use and applications
- Multiple tolerances applied to groups of features: CT, UF, CZ, SZ, SIM modifiers *(as per ISO 5458:2018)*
- General Tolerances with Profile *(as per ISO 22081:2021)*
- Composite, Two-Single Segment Position and Profile Tolerancing *(as per ISO 1660:2017)*
- Projected tolerance zones
- Geometrical tolerancing of non-rigid parts *(as per ISO 10759:2010/ DIS 2022)*
- Student supplied applications, practice using real –world industrial examples

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.