Geometrical Tolerancing

to BS 8888 and ISO Standards - NPL Level 2

an accredited training course in the National Physical Laboratory Training Framework

iain macleod associates

the benefits of using Geometrical Tolerancing correctly:

improved productivity • reduced costs • enhanced quality

- larger tolerance zones
- less ambiguous specifications
- the facility to tolerance form and relationships such as coaxiality
- uses datum structures that manufacturing and inspection can benefit from
- fewer disputes over compliance or non-compliance of components
- reduced scrap and re-work rates
- fewer queries due to incomplete specifications
- simplifies tolerance calculations to ensure correct fit and function

What do you learn on this course?

specifiers learn:

- more advanced datum structures, such as datums based on groups of features
- how to use the Maximum Material Requirement with zero tolerances
- how to use the Least Material Requirement with geometrical tolerances
- how to use the Maximum Material Condition modifier with datum references (datum shift)
- how to specify projected tolerance zones
- How to apply alternative size criteria (ISO 14405-1)

interpreters learn:

- how to interpret datums based on more than one datum feature
- how to interpret the Maximum Material Requirement when used with a zero tolerance
- how to interpret the Least Material Requirement
- how to interpret the Maximum Material Condition modifier when applied to a datum reference (datum shift)
- how to interpret projected tolerance zones
- How to interpret alternative size criteria

Who is the course for?

The Geometrical Tolerancing Level 2 course is intended for anyone who needs to understand the theory and practice of Geometrical Tolerancing, and to build on the understanding gained from the Level 1 course. The course is suitable for designers, manufacturing engineers and technicians, QC and inspection staff.

What prior knowledge is required?

Delegates should be familiar with the conventions of engineering drawing, such as projections, cross sections, representations of features such as screw threads, dimensions and ± or limit tolerances.

Delegates should also have completed the Geometrical Tolerancing Level 1 course.

NPL National Physical Laboratory Training

to book a course, call us on 0161 96 96 939 or email info@g-tol.co.uk

www.g-tol.co.uk

Course details:

- **Duration**
  The course lasts for two days
- **Venues**
  These training courses are normally delivered on-site for clients. Off-site venues can also be arranged.
- **Certification**
  Delegates who successfully complete the course are awarded an NPL Training certificate which is also recognised by The National Skills Academy for Manufacturing.
- **Course topics**
  - Review of fundamentals covered in Level 1
  - Advanced datum structures
    - datums based on multiple features
    - moving datum targets
  - Maximum Material Requirement used with zero tolerances
  - Use of the Least Material Condition Requirement
    - Least Material Virtual Condition
    - Least Material bonus tolerance
  - Application of Maximum Material Condition modifier to datum references
    - calculation of datum shift allowance
  - Alternative size and association criteria
    - different types of size (local size, global size, two-point size, spherical size, calculated size, rank-order size, etc)
    - Least-squares association
    - Maximum inscribed association
    - Minimum circumscribed association
  - Projected tolerance zones

The NPL Training Framework

The NPL training framework has been developed in partnership with industry with the following objectives:

- to develop core skills and competencies in practitioners
- to raise the level of technical knowledge
- to promote and instil good practice
- to foster a questioning and planning culture

The NPL training programmes are accredited by **NPL**, validated by **The National Skills Academy for Manufacturing**, and delivered only by **NPL Accredited Training Providers**.

Iain Macleod Associates is an **NPL Accredited Training Provider** and an **Approved Supplier to BAE SYSTEMS**.

Iain Macleod has been teaching Geometrical Tolerancing for nearly two decades. He chairs the BSI technical committee TDW/4/8 which is responsible for the development and maintenance of BS 8888.

Iain Macleod also represents the UK on ISO Technical Committee TC213 Working Group 18, which is responsible for the development of ISO standards for GD&T and GPS.

Iain Macleod Associates provide training and consultancy in:-

- *Geometrical Tolerancing*
- *Geometrical Product Specification*
- *BS 8888*
- *ASME Y14.5*
- *NPL Dimensional Measurement*
- *Tolerance Stack Calculations*
- *Surface Texture Specification*
- *Stress Analysis*
- *Engineering Drawing*

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