GD&T- NPL Level 1
to ASME Y14.5 1994
an accredited training course in the National Physical Laboratory Training Framework

iain macleod associates

benefits of using Geometric Dimensioning & Tolerancing (GD&T) correctly include improved productivity, reduced costs and 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:

- how to develop a specification in a systematic manner
- how to ensure that a specification is complete
- how to avoid common errors that cause problems with manufacture or inspection
- how to select datum features and define datum reference frames correctly
- how to apply GD&T in a logical and consistent manner
- how to calculate tolerance values and Virtual Condition boundaries to ensure that parts fit
- when to take advantage of the Maximum Material Condition modifier.

interpreters learn:

- how to recognise when a specification is incomplete or incorrect
- how to recognize common mistakes that cause problems with manufacture or inspection
- how to recognise when datums and datum reference frames are not defined correctly
- how to interpret GD&T in a systematic and logical manner
- what it means when Material Condition modifiers are applied to geometric tolerances
- how to calculate and apply bonus tolerances
- how to calculate Virtual Condition boundaries

Who is the course for?

The Geometric Dimensioning and Tolerancing course is intended for anyone who needs to understand the theory and practice of GD&T. 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.

The course goes back to first principles, so no prior knowledge of geometric tolerancing is required.

The course is not only for beginners - even engineers with 15 or 20 years experience of GD&T often express surprise at how much they learn.

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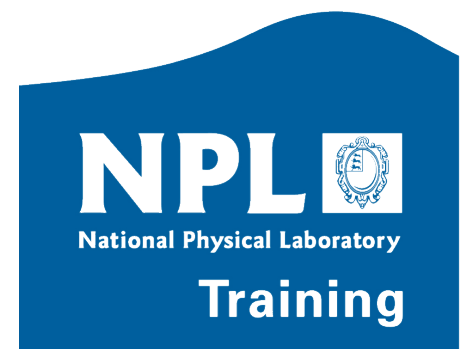
to book a course, call us on 0161 96 96 939 or email info@g-tol.co.uk

www.g-tol.co.uk

Course details:

❑ **Duration**
  The course lasts for three 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**
  ❑ Standards in context
    ❑ ASME Y14.5, British Standards and the ISO system
  ❑ Benefits of GD&T
  ❑ Features and Features-of-Size
    ❑ mating envelopes and geometric counterparts
  ❑ Rule #1 (the Taylor Principle)
  ❑ Datums and the Datum Reference Frame
    ❑ datums and datum features
    ❑ datum targets
    ❑ selection of datums
    ❑ setting up the Datum Reference Frame
    ❑ indicating datums on drawings
  ❑ Feature Control Frames
    ❑ tolerance symbols
    ❑ Feature Control Frame modifiers
    ❑ positioning the Feature Control Frame on the drawing
  ❑ Basic dimensions
  ❑ Tolerance characteristics (including what they will and won't control)
    ❑ Location tolerances
    ❑ Orientation tolerances
    ❑ Form tolerances
    ❑ Profile tolerances
    ❑ Run-out tolerances
  ❑ The GD&T roadmap – how to choose which tolerance to use
  ❑ Simple Clearance Fits
    ❑ 'Worst Case Boundaries'
    ❑ Virtual Condition & Virtual Size
    ❑ Maximum Material Condition and Bonus Tolerance
  ❑ Principle differences between GD&T to ASME Y14.5 and Geometrical Tolerancing according to BS 8888 and ISO standards

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 and GD&T for nearly two decades. He chairs 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.

In addition, Iain Macleod is the UK representative on the ISO study group (jointly chaired by Archie Anderson of ASME and Renald Vincent of AFNOR) which is currently identifying and mapping the differences and commonalities between the ISO GPS system and the American ASME Y14.5 standard.

Iain Macleod Associates provide training and consultancy in:-

- *Geometrical Tolerancing*
- *Geometrical Product Specification*
- *BS 8888 & ASME Y14.5*
- *Tolerance Stack Calculations*

tel: 0161 96 96 939
email: info@g-tol.co.uk
web: www.g-tol.co.uk