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# Intermediate and Advanced Geometric Dimensioning & Tolerancing (GD&T) Course No. 536

**FOR WHOM INTENDED:** This course is based on the latest ASME Y 14.5 2009 standard. It is intended for individuals performing inspection, design, manufacturing and assembly. Understanding geometric dimensioning and tolerancing is essential for anyone reading blue prints

**BRIEF COURSE DESCRIPTION:** Starting where [Course 535, GD&T](#) leaves off, this course covers units 7-17 of Al Neumann's *Geo Tol Pro Workbook, A Practical Guide to Geometric Tolerancing per ASME Y14.5 – 2009*. This course discusses major Y14.5 2009 changes such as maximum material boundary (MMB), least material boundary (LMB), and regardless of material boundary (RMB). The instructor covers more complex GD&T situations, including datum feature modifiers, more on datum reference frames, form tolerances, orientation tolerances, profile and position tolerances in further detail. Coaxial tolerances, fixed and floating fastener formulas along with their application are discussed throughout the color workbook.

Students will participate in practical exercises to demonstrate their understanding of the material covered.

Participants successfully completing this course will be able to understand, evaluate and use intermediate and advanced geometric dimensioning techniques. They will be able to read and fully understand blueprint drawings of mechanical devices.

**DIPLOMA PROGRAMS:** This course may be used as an elective for TTI's [Metrology/Calibration Specialist \(MSC\)](#) or [Mechanical Design Specialist \(MDS\)](#) Diploma Programs, or for any other [TTI Specialist Diploma Program](#).

**RELATED COURSES** [Course 535, GD&T: Practical Interpretation and Measurement](#), serves as an introduction to the concepts covered in more depth in this course. The first day of [Course 535](#) is also offered separately as [Course 534, Introduction to Geometric Dimensioning and Tolerancing](#). [Course 537, Tolerance Stacks and Applications](#), is also available.

**PREREQUISITES:** Students must complete [TTi course 535](#), or be able demonstrate equivalent knowledge. This course is intended for individuals involved in a related technical field.

**TEXT** Students who have already taken the prerequisite [course 535](#) should bring their copy of Al Neumann's *Geo Tol Pro Workbook, A Practical Guide to Geometric Tolerancing per ASME Y14.5 – 2009*. This full-color book, which is considered the definitive reference work in the GD&T industry, may be purchased by those students who do not already have a copy.

**COURSE HOURS, CERTIFICATE AND CEUs** On-site courses can vary from 14–35 hours over 2–5 days as requested by our clients. Upon successful course completion, each participant receives a certificate of completion and one Continuing Education Unit (CEU) for every ten class hours.

## Course Outline

### Datum Feature Modifiers

- Datum Feature Modifiers - MMB, LMB, and RMB
- Alignment Plate Assembly
- Comparison of Datum Feature Modifiers
- Calculating Datum Feature Boundaries
- Simultaneous and Separate Requirement
- Paper Gage /Datum Feature Shift

### Datum Reference Frame II - Targets and Irregular Surfaces

- Inclined & Contoured Surfaces
- Selection and Qualification • Datum Targets
- Turbine Blade • Hood Panel • Pillow Block
- Movable Datum Targets

### Datum Reference Frame III - Advanced Concepts

- Two Holes, Pattern of Holes, Coaxial Holes, Irregular Datum Feature • Translation Modifier
- Customized Datum Reference Frame
- Multiple Datum Reference Frames

### Form Tolerances: Flatness, Flatness of Median Plane

- Straightness • Circularity • Cylindricity • Avg Diameter

### Orientation Tolerances: Parallelism • Perpendicularity

- Angularity & Use of Angularity for above tolerances
- Perpendicularity of Zero at MMC

### Profile Tolerances: Bilateral, Unilateral,

- Unilateral unequal (2009 symbol)

- Cam Wheel Application • Profile Inspection Reporting

- Fuel Line Bracket & Clamp • ASME & ISO Sharp Corner

- Non-Uniform Profile • Composite Profile • Coplanarity

- Radius Control • Free State / Restrained

### Position Tolerances:

- Cylindrical, Rectangular, Spherical, Conical

- Position Boundary • Composite Position with Paper Gage

- Composite Position Application • Continuous Feature

- Datum Features Referenced Individually

### Coaxial Tolerances: Coaxial • Run-out • Position • Profile

- Concentricity & Symmetry

- Comparison and Best Application of

### Fastener Formulas and Screw Threads

- Floating and Fixed Fastener Formulas

- Projected Tolerance Zone with Diagram

### Inner and Outer Boundary Formulas

- Boundaries RFS, MMC, LMC

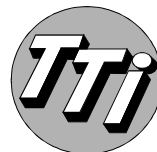
- Boundary and Minimum Wall Calculations

- IB and OB Stack-up Calculations • What is Wrong?

### Final Review of Course Material

- Student Exercises-utilizing full color course material in a practical application

- Award of Certificates for Successful Completion



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