# Geometric Dimensioning and Tolerance (GD&T)

## CEQAL 501

The course provides a sound fundamental background for the understanding and application of the Geometric Dimensioning and Tolerancing. The seminar content follows the ASME Y14.5M1994 standard and also addresses special applications such as the Auto Industry Addendum. Extensive application of exercises and problem solving results in strong reinforcement of the basic concepts.

**Who Should attend:** Design, tooling and process engineers, quality managers, quality engineers, CAD operators, inspectors, manufacturing technicians and tool and die makers.

**Prerequisite:** None

**CEU's Credits:** 1.6

**Duration**: 16 Hours – 2-day course

**Course Content:**

**Introduction**

- Background and History
- Review of Dimensioning and Tolerancing Practices and Rules
- Advantage of Geometric vs. Coordinate Tolerencing
- Terminology, Symbols and Definitions
- Standards; ASME Y 14.5M-1994 and the Auto Industry Addendum

**Fundamental Concepts**

- Rules #1 and #2
- The Application of the Feature Control Frame
- Proper Selection and Application Planar Datums and Feature of Size Datums

- Datum Reference Frames and Controlling Degrees of Freedom
- Envelope Principle, Worst Case Boundaries and Virtual Conditions
- Basic Dimensions
- Gaging Concepts
- Bonus and Datum Shift
- Material Condition Modifiers
- Other G,D & T Tolerance Modifiers
- Tolerance Zone Shapes

**Interpretation and Use of Form Tolerances**
- Straightness, Flatness, Cylindricity and Circularity
- Inspection and interpretation

**Interpretation and Use of Orientation Controls**
- Angularity, Perpendicularity and Parallelism
- Applied to Planar Features and Features of Size
- Tangent Plane Modifier
- Inspection and Interpretation

**Interpretation and Use of Location Tolerances**
- Position, Concentricity, and Symmetry
- Zero-Position Tolerance at Maximum Material Condition
- Comparing RFS, MMC and LMC
- Special Applications
- Tolerance Stack-up Calculations
- Fixed and Floating Fastener Equations
- Projected Tolerance Zones
- Inspection and Interpretation

**Interpretation and Use of Runout Tolerances**
- Composite Tolerance Concept Applied to Runout
- Circular Runout
- Total Runout
- Inspection and Interpretation

**Interpretation and Use of Profile Tolerances**
- Profile of a Line, Profile of a Surface
- Composite Tolerance Concept Applied to Profile
- Basic Dimensions applied to Profile Tolerances
- Limiting and Expanding Applications
- Inspection and Interpretation

**Practice and Real Applications**

- Students solve many problems to reinforce the concepts, under the guidance of the instructor.
- Students are prompted to bring real drawings that give them problems – The instructor has yet to be stumped!
- Students can ask Instructor Questions by e-mail after Completion of Class (limit to 3 months after program).

*Each participant will receive a comprehensive manual and a Certificate of Completion at the close of the seminar.*