Quality LearningHub & Consultancy Singapore
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ADVANCED GEOMETRIC DIMENSIONING AND TOLERANCING

Introduction:

This accelerated workshop is intended for design and manufacturing personnel who required advanced use of extended principles of GD&T to communicate design intent for more complex parts and assemblies. In this workshop, participants will learn about advanced GD&T concepts like composite tolerancing, tolerance analysis, datum selection and many more key dimensioning topics.

Course Contents:

Quick Recap: Basics of GD&T (around 30 minutes)

- Revision of GD&T fundamentals
- Feature of size and non-size features
- Virtual condition
- 14 GD&T Symbols
- Applications of Material Condition Modifier
- Basic Datums

Form Tolerances

- Straightness tolerance for surface elements
- Straightness tolerance with MMC modifier
- Flatness tolerance for single planar feature
- Flatness tolerance with MMC modifier
- Flatness tolerance on unit-basis
- Circularity in free state condition

Datums

- 4 criterion to select datums
- 3-2-1 Principle and Six Degrees of Freedom
- Datum center plane
- Partial Datum
- Coaxial and Co-planar datums
- Datum feature simulators - Physical
- Datum Targets: Points, Line, Area
- Temporary Datums
- Datum Feature shift (or Datum shift)
- Inclined Datum Features

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- New datum features: Conical, Linear extruded shape, Complex Shape
- Individual datums (Repetitive Patterns of Features)
- Datum MMB calculations

Orientation Tolerances

- Perpendicularity tolerances with multiple datums
- Perpendicularity tolerances applied to feature of size
- Parallelism tolerances applied to feature of size
- Angularity tolerances applied to a feature of size
- Orientation tolerances in multiple segment (combined) feature control frame
- Inspection methods to verify orientation tolerances
- Tangent modifier
- How to make 3D orientation tolerances to 2D
- Orientation tolerances in multiple segment (combined) feature control frame

Location Tolerances

A) Position Tolerance
- Position –Boundary (for slots)
- Zero Tolerance at MMC
- Projected Tolerance Zone
- Simultaneous requirement
- Separate requirement
- Composite Position tolerance:
  - Pattern-locating Tolerance Zone Framework (PLTZF)
  - Feature-relating Tolerance Zone Framework (FRTZF)
- Composite tolerance for Linear Coaxial Feature Alignment
- Rules of composite tolerancing
- Bi-Directional Tolerancing for pattern of features
- Floating Fastener Formula
- Fixed Fastener Formula
- Exercises for position

B) Runout Tolerances
- Circular Runout Tolerance for sphere
- Circular Run out Tolerance for cone
- Circular Run out Tolerance for curve
- Total Run out for planar surfaces
- Runout tolerance with co-axial datum (A-B)
- Total runout applied on partial length

C) Profile Tolerances
- Multi-segment or combined profile tolerance
- Composite tolerances:
  - Composite tolerance with no datum / 1datum / 2 datums / 3 datums
  - 2-tier composite tolerance
- Multi-segment or combined profile tolerance
- Profile on a Unit Basis
- Restraint notes on non-rigid parts
  - specification and interpretation
- All-around and all-over modifiers
- Exercise for profile

D) Concentricity & Symmetry Tolerances
- How to use position tolerance instead of concentricity
- How to use position tolerance instead of symmetry

Gauges to verify Geometrical tolerances
- Functional / Fixed Gauges:
- Go-Gauges / No Go-Gauges
- Functional Gauges (Also known as Attribute / Fixed / Receiving / Qualifying gauges)
- Gauge design exercises
- Variable Gauges
- Various geometrical tolerance inspection tools

Prerequisites

Basics of GD&T is a MUST

Who Should Attend

This workshop is designed for anyone who is currently familiar and proficient with the concepts and practices of GD&T, and requiring a greater understanding of GD&T from an advanced application perspective. This advanced-level course is highly beneficial for Designers, Product Engineers, Process Engineers, Quality Engineers, Manufacturing Engineers, Manufacturing Personnel, Quality Technicians, Quality Managers and Quality/Gaging Inspectors with a basic knowledge of GD&T concepts

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Award of Certificate:

Participants will be issued with a Certificate of Successful Completion upon meeting 75% of the required course attendance.

Duration:

3 days (21 hours)

Course Fee:

$1000 nett per trainee (GST is not applicable).

(Course fee is inclusive of all training materials and light refreshments.)