

Training will be delivered according to these latest ISO GPS Standards:

- ISO 8015:2011
- ISO 1101:2017
- ISO 5458:2018
- ISO 5459:2011
- ISO 2692:2014
- ISO 1660:2017
- ISO 2768: 1989
- ISO 14405: 2016
- And other related ISO GPS standards

GPS Introduction

- What is GPS? Why use GPS?
- How does GPS work?
- Comparison of GPS with Coordinate Dimensioning and Tolerancing

Part Features, Feature of Size, Non-size Features

- What are Part Features?
- Features of Size
- Non-Size Features

14 Geometrical Specifications (GPS Symbols)

- Tolerance indicator (Frame) and its placement
- How to read tolerance indicator?
- Modifier symbols: MMR, LMR, RFS
- When to use MMR, LMR and RFS modifier in design (correct applications)
- Bonus tolerance calculations
- Independency Principle (Default)
- Invoke Envelope principle

Maximum Material Virtual Condition (MMVC)

- Importance of MMVC in product designs and functional gauge designs
- MMVC calculations
- Use MMVC for mating parts as well to design fixed gauges
- 100% interchangeability and MMVC
- Classroom exercise for MMVC

Auxiliary Feature Indicators

- Intersection plane indicator
- Orientation plane indicator
- Collection plane indicator

Form Specifications

- Relationship between Envelope principle and form specification
- Inspection methods to verify form specifications
- Design recommendation on why to use form specifications only when required to ensure successful design intent
- Flatness specification
- Flatness specification for multiple indicator pattern
- CZ Modifier on flatness
- Flatness on restrictive specifications basis
- Straightness specification for line elements
- Roundness specification
- Cylindricity specification
- Relationship between Envelope principle and form specifications
- Inspection methods to verify form specifications

Location Specifications

A) Position Specification

- How it works? How to apply it?
- Position for cylindrical features on MMR, LMR and RFS basis
- Detailed table calculations for position specification on MMR, LMR and RFS
- CZ Modifier
- SZ Modifier
- Position on Boundary basis for rectangular or oblong slots
- Position applied to nominally flat or planar surface
- Zero tolerance at MMR basis
- Projected toleranced feature
- Position specification of a planar surface
- Simultaneous Vs Separate requirements
- Multi-level Single Indicator Pattern Specification
- Stacked tolerance indications
- Use position to control co-axial features
- Inspection methods to verify position specification
- Class room exercise for position

C) Coaxiality, Concentricity & Symmetry Specifications

- How it works? How to apply it?
- Coaxiality specification
- Coaxiality specification on MMR basis
- Coaxiality specification MMVS calculations
- Concentricity specification
- Symmetry specification
- Inspection methods to verify concentricity & symmetry specification

B) Profile Specifications

- How it works? How to apply it?
- Line Profile specification
- Surface profile specification
- 2 types of Profile Tolerance Zone
 - Bi-lateral
 - Unilateral using UZ Modifier
- UF Modifier
- Controlling extent of profile specification
- All-around profile specification
- Offset tolerance zone with specified offset
- Multi-segment or combined profile specification
- Multi-level Single Indicator Pattern specification
- Profile on a restrictive specification
- Surface profile specification for a united feature
- Unequally disposed surface profile specification for a united feature
- Unequally disposed surface profile specification with variable displacement
- How to control co-planarity using profile specification
- Class room exercise for profile
- Inspection methods to verify Profile specifications

D) Run-out Specifications

- How it works? How to apply it?
- Circular run-out specification – Radial
- Circular run-out specification – Axial
- Circular run-out in any direction
- Total run-out specification – Radial
- Total run-out for flat surfaces: Axial
- Total run-out applied on partial length
- Total run-out specification – Radial with common datums (A-B)
- Inspection methods to verify run-out specifications

Orientation Specifications

- How it works? How to apply it?
- Perpendicularity specification
- Perpendicularity specification with multiple datums
- Parallelism specification
- Parallelism: restricted area tolerance feature
- Angularity specification
- Applied to a planar feature
- Orientation specification applied to a feature of size
- Orientation specifications in multiple segment (combined) tolerance indicator
- Inspection methods to verify orientation specifications
- Class room exercise for orientation specifications

Gauges to verify Geometrical Specifications

- Functional / Fixed Gauges:
 - Go-Gauges / No Go-Gauges
 - Attribute / Fixed gauges
 - Gauge size calculations and gauge-makers tolerances
 - Gauge design exercises
- Variable Gauges
- Various geometrical specifications inspection tools
- Hand calculation for position specification using Pythagoras theorem

Datums

- What is datum?
- Six Degrees of Freedom
- 3-2-1 principle
- Datum System (Cartesian coordinate system)
- Datum Feature Selection, Functional Hierarchy
- Datum feature identification / placements and interpretation
- Datum plane, datum axis, Datum median plane
- Physical datum feature simulators
- Datum feature qualification
- Importance of Datum Precedence
- Select datum features according to the design intent
- 4 criterion to select datums
- Partial Datum
- Common datums: Two parallel cylinders
- Common datums: Pattern of cylinders
- Common datums: Two coaxial cylinders
- Common datums: Two coplanar planes
- Datum Targets: Points, Line, Area
- Datum feature shift: Datum on MMR basis
- Proper Sequence in applying datums and GD&T

Overview of ISO 2768 - 1 & 2 standards

- General Linear and Angular tolerances
- Envelope requirement
- Geometrical Linear and Angular tolerances
- Rule regarding automatic rejection

Contact

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Thank You !