Gary K. Griffith

- 42 Years Exp.
  - Automotive
  - Aerospace
    - Engineering
    - Manufacturing
    - Quality

- Technical Book Author
  - Quality
  - Engineering
  - Shop Technical

Photos Reference: Geometric Tolerancing Applications and Inspection (Prentice Hall)
Outlines – Session 3

- Location Tolerances
  - Concentricity
  - Symmetry
  - Position

Limitations are:
1. Inspector’s Knowledge / Skills
2. Available Inspection Equipment
Concentricity Tolerance
Concentricity Tolerance

Concentricity is a coaxial tolerance that is always RFS. It is axis-to-axis control where differential measurements are required.
Concentricity Tolerance

Two opposing dial indicators. Part is rotated and differential measurements determine eccentricity.

Note: For quick verification, measure runout. TIR must not exceed .002" in this case.
Symmetry Tolerance
Symmetry Tolerance

The center plane of the 1.220-1.230 boss must be centered on datum center plane A (RFS)

Opposing height measurements. Differentials calculated.
Position Tolerances
Position Tolerance (Symmetry)

Symmetry is being controlled by position. MMC modifiers have been applied. Bonus and additional tolerance allowed depending on actual sizes.

A Functional Gage
Position controls location and perpendicularity to primary datum A.
Surface plate accessories help establish functional datums on the CMM. Note: CMM should have GDT software for support.
Position Tolerance
Polar Coordinates

CMM or Functional Gage (if MMC is specified)

Functional Gage
Position Tolerance
(Virtual Datum)

When a datum of size has a virtual condition. The virtual condition (3.010) is the basis for the relationship.

Courtesy of Barry Controls Aerospace, Burbank, Ca
Position Tolerance
Virtual Datum

CMM or Functional Gage (shown)

3.0100” Virtual Diameter

Courtesy of Barry Controls Aerospace, Burbank, Ca
Position Tolerance (Pattern Location)

This position tolerance is controlling feature relation, perpendicularly, and pattern location.
Position Tolerance Pattern Location

A functional gage with four virtual pins could be used.

Courtesy of Vescio Manufacturing
Coordinate measuring machine being setup.

Courtesy of Vescio Manufacturing
Griffith Training

On-Site Tailored GD&T Training:
- Basic
- Intermediate
- Advanced

- Tolerance Stackup Analysis
- Functional Gage Design
- Inspection
- Quality Courses

Consulting:
- Functional Design Drawing Reviews
- Tolerance Stackups
- Functional Gage Designs
Questions and Answers

Need Training?

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