Geometric Tolerancing
PMPA Technical Conference

Developing Today’s Talent
For Tomorrow’s Success

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

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Photos Reference: Geometric Tolerancing Applications and Inspection (Prentice Hall)
“Runout & Profile Tolerances”
Interpretation & Inspection

Outline – Session 2

- Runout Tolerances
  - Circular Runout
  - Total Runout

- Profile Tolerances
  - Profile of a Line
  - Profile of a Surface

Limitations are:
1. Inspector’s Knowledge / Skills
2. Available Inspection Equipment
Runout Tolerances

Total Indicator Reading (TIR)
Full Indicator Movement (FIM)
Circular Runout Tolerance

Circular runout controls roundness and concentricity. Circular runout measurement is always a T.I.R.
Total Runout Tolerance

Total runout controls roundness, straightness, taper, and concentricity. It is a composite T.I.R.
Total Runout Tolerance

While the part is rotated, the dial indicator is traversed (stays on top-dead-center) to the other end.

NOTICE THE PARALLEL THAT IS GUIDING THE DIAL INDICATOR BASE.
Profile Tolerances
Optical Comparators and Coordinate Measuring Machines (CMM’s) are most often used for profile measurement.
Profile Tolerance (No Datum)

If no datum is specified, profile only controls shape. In this case, the control is limited between X and Y.

THE TOLERANCE ZONE IS TWO LINES (± .0025) AROUND THE PERFECT PROFILE

NOTE: BEST FIT IS ALLOWED.
Profile Tolerance
No Datums

A Mylar overlay can be prepared. Once the part is focused, the overlay can be shifted / rotated for best fit.
Profile Tolerance
No Datums

Mylar overlay for Comparator does not need cross-Hairs. Best fit is allowed during inspection.
Profile Tolerance
No Datums

The part is acceptable after best-fit.

Mylar can be shifted or rotated to fit.
Profile Tolerance
Datums Specified

When datums are specified, the profile tolerance controls the shape and location.
Datums restrict best fit. The surface controlled must be within shape and location.

This part is not in profile tolerance.
Profile Tolerance Datums Specified

This part is too thick for optical comparator use. A CMM would often be used in this case.
Profile Tolerance
“Coplanar” No Datums

The two surfaces must be in-plane within .0005”
Profile Tolerance
“Coplanar” No Datums

Profile controls coplanar and flatness.
Both surfaces must be within .0005” TIR
Profile Tolerance
“Coplanar” Datums

Profile zone is two planes .005” apart and centered on datum A-B. Three surfaces must be located within that zone.
Part is mounted on datums A-B. Dial indicator is zeroed on datums A-B. Each surface must be ±.0025 from A-B.
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Questions and Answers

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