Flatness inspection plan for a surface grinder table

surface-grinder-table

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Application template; not a claim of a completed customer project.

Scope

For installation acceptance and periodic re-inspection of a rectangular surface grinder table (800×400 mm, example/teaching data). An autocollimator measures the straightness of grid lines; heights are tied to a common datum through shared intersection nodes to build a full-surface height matrix. The evaluation method (minimum zone or least squares) must be agreed before measurement and the two results must never share the same name. Sequence: agree datum and method, lay out stations and measure, convert and evaluate, then run a reverse check and deliver records.

Equipment and configuration guidance

• Photoelectric autocollimator, 0.1″ class resolution (example/teaching data)

• Reflector base with a known 100 mm span

• Electronic level for cross-checking

• Station markers and temperature logger

Principle and calculation

Δh=L·tanθ; with L=100 mm, 1″≈0.485 μm (example/teaching data). After tying all lines to a common datum, flatness f_MZ is the separation of the minimum-zone enclosing planes. The least-squares residual peak-to-valley is for comparison only; the two must not be named interchangeably.

On-site checklist

• Base span matches the sampling step

• No abnormal jump at shared intersection nodes

• Reverse-run differences and drift recorded

• Evaluation name matches the actual algorithm

Suggested records

• Layout drawing and raw angle table

• Full-surface height matrix and contour map

• Minimum-zone flatness result

• Environment log and uncertainty statement

Limitations

Covers geometric flatness only; grinding heat, material ageing and dynamic accuracy are excluded. Deformation under heavy load requires separate assessment, and data are not comparable with other support states.

Detailed teaching example

Surface Grinder Table Flatness Inspection · Tutorial Case

Scenario and task

Teaching demonstration, not a real customer project: segmented flatness inspection of a surface grinder electromagnetic worktable in a training workshop; span and readings are instructional data.

Workflow overview

Set up instrument → Place bridge → Read per step → Convert heights → Cumulate & evaluate

Preparation and measurement steps

01. Clean the worktable and level the bed on adjusting shims

02. Mount the autocollimator on a rigid stand beside the grinder, optical axis parallel to table travel

03. Use a 150 mm bridge with the reflector at its centre

04. Move the bridge end-to-end from one end of the table, recording angular readings per step

05. Record 20 °C and process the three readings

Teaching example readings

• Bridge span L=150 mm; segment 1 autocollimator reading θ□=+0.8″

• Segment 2 autocollimator reading θ□=-1.2″

• Segment 3 autocollimator reading θ□=+1.6″

Calculation procedure

Height conversion: Δh = L·tan(θ·π/648000)×1000 (μm). Segment 1: 150×tan(+0.8″)=+0.58 μm; Segment 2: 150×tan(-1.2″)=-0.87 μm; Segment 3: 150×tan(+1.6″)=+1.16 μm. Cumulative heights: 0→+0.58→-0.29→+0.87 μm; peak-to-valley PV=+0.87−(-0.29)=+1.16 μm.

Example result and interpretation

Tutorial result PV≈1.16 μm, demonstrating the micrometre-level flatness evaluation workflow; compliant against a 0.005 mm teaching tolerance.

Example verification checklist

• Bridge feet contact the table without gaps or burr interference

• Repeat each reading twice; differences must not exceed 0.2″

• Check the cumulative sign convention: rise positive, fall negative

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