Perpendicularity inspection plan for a rolling mill housing window

rolling-mill-window

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

Scope

For perpendicularity of the two column faces of a rolling mill housing window (4000 mm window height, example/teaching data) to its base, and the relative angle (gap taper) between the column faces. A pentaprism folds the vertical measuring line into the horizontal autocollimator path; the base reference line is measured first, then the column face station by station.

Equipment and configuration guidance

• Photoelectric autocollimator (0.1″ class)

• Pentaprism with vertical slide carriage (90° fold verified, example)

• 250 mm span reflector/prism base

• Stable stands, station markers and temperature logger

Principle and calculation

Perpendicularity is the end-to-end lateral offset $\Delta=\Sigma L\cdot\tan\theta i$ over the full height; window taper is the algebraic combination of the two column tilt curves. With L=250 mm, 1″≈1.212 μm (example/teaching data). The pentaprism 90° fold error must be verified first and treated as a systematic term.

On-site checklist

• Pentaprism 90° fold angle verified

• Base reference line straightness measured first

• Reverse-run difference and carriage repeatability recorded

Suggested records

• Base reference-line profile

• Column tilt curves and full-height perpendicularity

• Window taper data and grinding/adjustment advice

Limitations

Excludes elastic housing deformation under rolling load and local high spots on the window faces (contact measurement required). Assembly mismatch of multi-piece housings is outside this plan.

Detailed teaching example

Rolling Mill Housing Window Perpendicularity Inspection · Tutorial Case

Scenario and task

Teaching demonstration, not a real customer project: segmented angular survey of a rolling mill housing window face for perpendicularity; data are instructional settings.

Workflow overview

Clean window → Vertical axis → Step upward → Log readings → Perpendicularity

Preparation and measurement steps

01. Clean the window faces of the mill housing teaching model

02. Place the autocollimator on a stand below the window, optical axis vertical onto the window rail face

03. Step a 250 mm bridge upward along the window face

04. Record the pitch reading per segment

05. Cumulate and convert for perpendicularity results

Teaching example readings

• Bridge span L=250 mm; segment 1 autocollimator reading θ□=+0.8″

• Segment 2 autocollimator reading θ□=-1.2″

• Segment 3 autocollimator reading θ□=+1.5″

Calculation procedure

Height conversion: Δh = L·tan(θ·π/648000)×1000 (μm). Segment 1: 250×tan(+0.8″)=+0.97 μm; Segment 2: 250×tan(-1.2″)=-1.45 μm; Segment 3: 250×tan(+1.5″)=+1.82 μm. Cumulative heights: 0→+0.97→-0.48→+1.34 μm; peak-to-valley PV=+1.34−(-0.48)=+1.82 μm.

Example result and interpretation

Tutorial result PV≈1.82 μm, demonstrating the geometric inspection workflow for the mill housing window.

Example verification checklist

• Bridge seats firmly on the window rail face

• No vibration or displacement of the model during readings

• Survey both window faces separately as cross-check

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