

Battery Machine Vision Inspection 2026

Acceptance Criteria and the Buyer's RFQ Sheet — NEGUP MACHINE

Why inspection is the cheapest quality gate

A single 1% defect rate inside a gigafactory-scale line can mean hundreds of millions of dollars in scrap, rework and warranty claims every year. That arithmetic — plus tightening safety rules such as EU Battery Regulation (EU) 2023/1542 and China's GB/T standards — has moved battery machine vision inspection from a final spot-check to the control layer that decides whether a cell or pack ever ships. PW Consulting sizes the global lithium battery machine vision inspection market at **USD 2.35 billion in 2025**, reaching **USD 6.86 billion by 2032 at a 16.54% CAGR**, with Asia-Pacific the largest region at roughly USD 1.42 billion (PW Consulting, 2026).

Table 1 — The 2026 inspection equipment market in numbers

Lithium battery machine vision inspection, 2025	USD 2.35 billion	PW Consulting, 2026
Lithium battery machine vision inspection, 2032F	USD 6.86 billion, 16.54% CAGR	PW Consulting, 2026
2026 / 2027 market size	USD 2.78B (+18.4%) / 3.18B	PW Consulting, 2026
Hardware share of the vision market, 2025	65.5%	PW Consulting, 2026
Largest inspection stage, 2025	Cell Assembly, 44.5%	PW Consulting, 2026
China machine vision inspection	RMB 2.1B (2022) → 8.0B (2026F), 40% CAGR	GGII, 2023/2026
X-ray inspection for secondary battery, 2025	USD 1.80B → 3.45B (2032), 9.85% CAGR	PW Consulting, 2026
New-energy X-ray intelligent inspection, 2025	USD 658.2M → 2.13B (2032), 18.3% CAGR	PW Consulting, 2026

Cell assembly is the single largest inspection stage — stacking, winding, welding and appearance checks concentrate there, which is why pack builders qualify those stations first.

Six inline inspection stations

Electrode coating and alignment — dimensional and appearance checks catch edge burrs and non-uniform thickness before material is committed.

Winding / stacking offset — verifies layer alignment during cell assembly; a few-micron drift degrades energy density and raises short-circuit risk.

Weld seam inspection — classifies missing, cold or spattered welds on tabs, cans and busbars at reported accuracy above 99.5%.

Six-side appearance — full-surface check for dents, scratches, contamination and label errors.

X-ray internal inspection — non-destructive look at electrode overhang, winding offset, tab folding and foreign metal inside sealed cells.

Module and busbar inspection — verifies joint geometry and weld integrity before the pack is enclosed.

Table 2 — Inspection by cell format

Cylindrical	Tesla 4680 (46 × 80 mm)	Six-side appearance, laser weld seam, terminal geometry	Coating edge burr, weld spatter, dents, tab fold

Prismatic	EVE LF314 / 314 Ah	Sealing weld, busbar joint, large-format flatness, internal X-ray	Winding offset, foreign particle, tab fold, internal void
Pouch	50 Ah NCM power pouch	Lamination alignment, pouch-seal integrity, swelling	Electrode overhang, seal leak, soft-pack crease, delamination

A station qualified only on one format will under-perform on the others; multi-format handling — not just a higher camera — protects yield when product mix changes.

Table 3 — Acceptance criteria for the RFQ

Appearance / AOI defect recognition	≥99.5% accuracy, validated against reference samples	100% of cells, inline
X-ray internal defect detection	Overhang, winding offset, tab fold, foreign metal; AI accuracy >99%	100% on sealed cells, inline
False-rejection rate	Reduced >40% vs legacy rule-based systems	Per shift, tracked in MES
Resolution / tolerance	Coating uniformity within ±1 µm; sub-3 µm premium tier	Electrode and weld inspection
Throughput	Hundreds of cells per minute at line takt	Inline, no buffering bottleneck
Traceability	Per-cell image + measurement record written to MES	Every cell, queryable genealogy

NEGUP MACHINE builds the inspection and verification sequence behind these gates: the **NG-008 comprehensive tester** for appearance and electrical checks, the **NG-013 cell grading machine** and the **NG-014 pack aging machine** for capacity and durability gates, and PACK/module EOL comprehensive test systems. Tell us your cell format, defect modes and target takt, and we will size the vision and X-ray stations to the process rather than to a datasheet.

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