AssociatedEngineers

Cell Orientation & Placement Check in Battery

Industry: Automotive, Battery, EV

Solution: Machine Vision System for EV Battery Module Assembly

Why Battery Cell Orientation Inspection is Critical

Battery safety starts at the cell level.

A single flipped, tilted, or missing cell can cause bonding errors, electrical failures, or thermal events.

Manual inspection is slow and inconsistent.

Our automated machine vision solution solves this with high precision and speed.

What is Cell orientation and placement check?

It is the **automated validation** of:

- **Polarity direction** (positive/negative terminals facing correct sides)
- **Mechanical alignment** (spacing, angle, flatness)
- **Presence and order** of battery cells (in modules or stacks)
- **Rotation or flipping errors** before bonding/welding

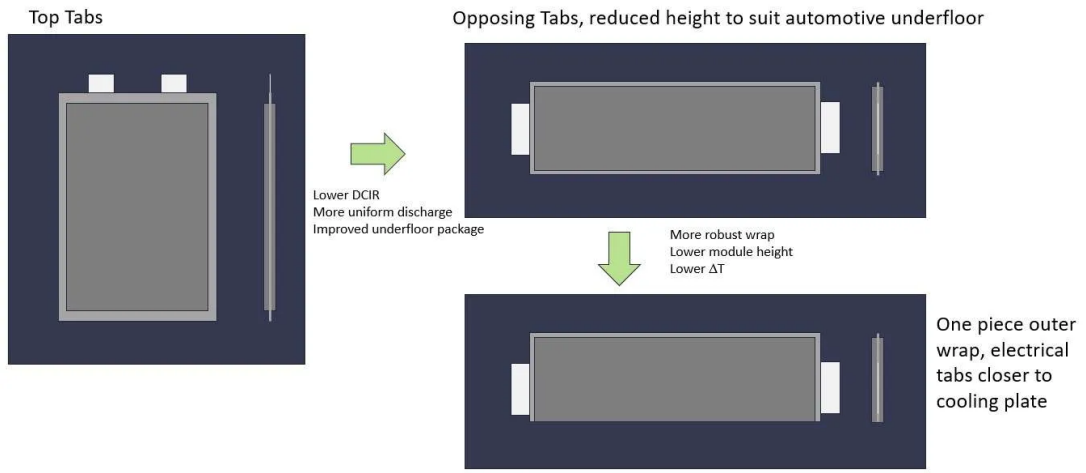
Key Inspection Capabilities

- Polarity Direction – Detects incorrect terminal/tab placement
- Skew or Tilt – Flags angle deviations beyond 1°
- Flipping / Rotation – Identifies reversed cell orientations
- Missing / Double Cells – Ensures correct stacking
- Tab Positioning – Verifies correct alignment for pouch formats

How does machine vision help

In a **pouch cell line**, cameras above the conveyor verify:

- Tab position: should be top-left for positive
- Cell skew or tilt: angle tolerance <1°
- Missing or double-cell placements



How the System Works

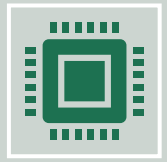
HIGH-SPEED INDUSTRIAL CAMERAS SCAN EACH CELL.

CUSTOM AI ALGORITHMS INSPECT POLARITY, TILT, AND POSITION.

REAL-TIME LOGIC TRIGGERS PASS/FAIL COMMANDS TO YOUR PLC.

COMPATIBLE WITH NEW OR RETROFIT LINES.

Hardware & Data Flow Architecture



System Flow: Camera → Vision Processor → PLC/MES.

Includes lighting, control UI, and modular camera setup for conveyor environments.

Why Our System Works Reliably

- Optimized selection of lighting, lenses, and hardware for precision.
- Overcomes challenges: skewness, depth of field, and multi-color batch codes.
- Ensures high repeatability with expert automation consultancy.
- Integrates advanced machine vision for superior accuracy.

Proven Accuracy & Efficiency

Inspection Speed: <0.5 sec per cell

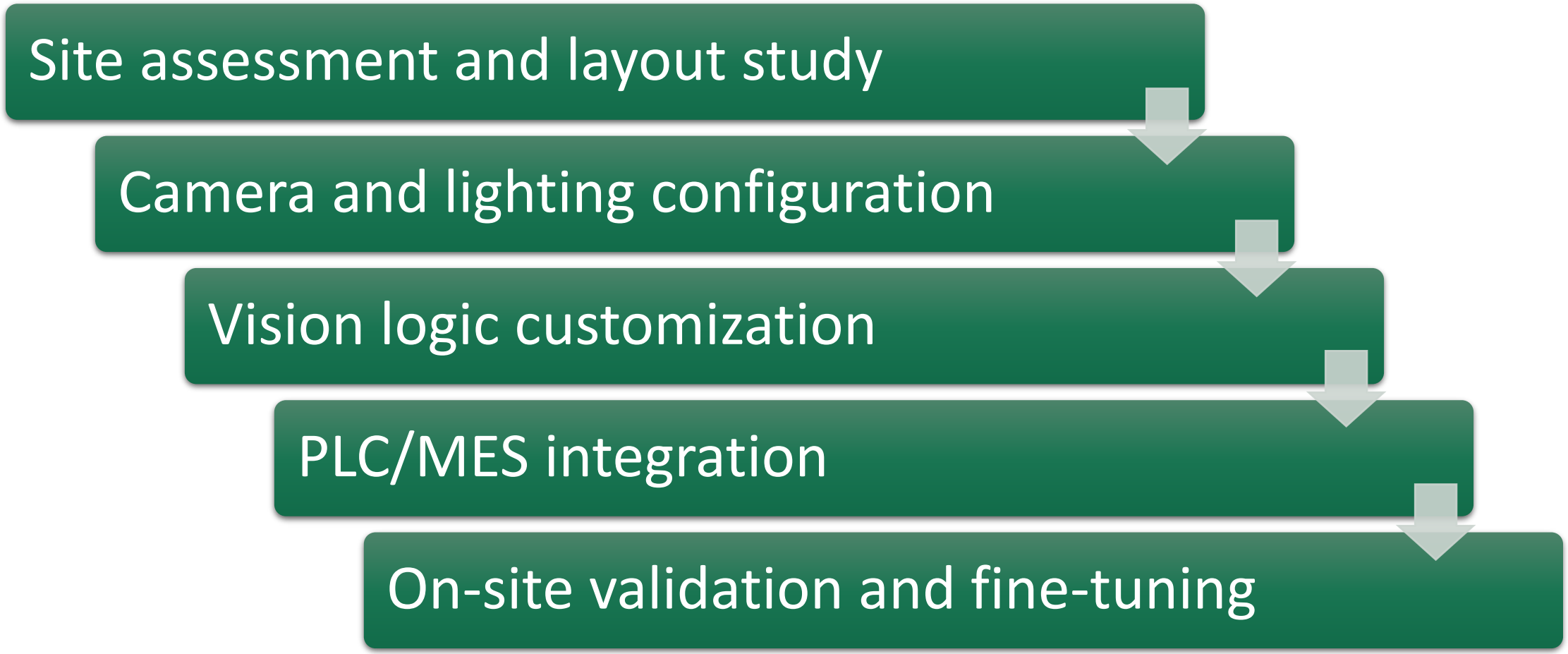
Tilt Accuracy: ±1°

Error Detection Rate: >99.98%

False Positives: <0.02%

Integration Time: 3–5 days

Deployment & Integration Process



Where It Works Best

- EV Battery Packs – Cell orientation and bonding pre-check
- ESS Modules – Skew detection in battery banks
- Automotive Tiers – QA of submodules
- Robotics Batteries – Compact multi-cell lines

Prevent Cell Errors Before They Happen. Automate Now!

Ensure cell alignment & orientation accuracy

Avoid costly rework & safety risks

Increase line efficiency with real-time inspection

Book a demo or site consultation today!

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