CAPABILITY DECK · 2026 EDITION

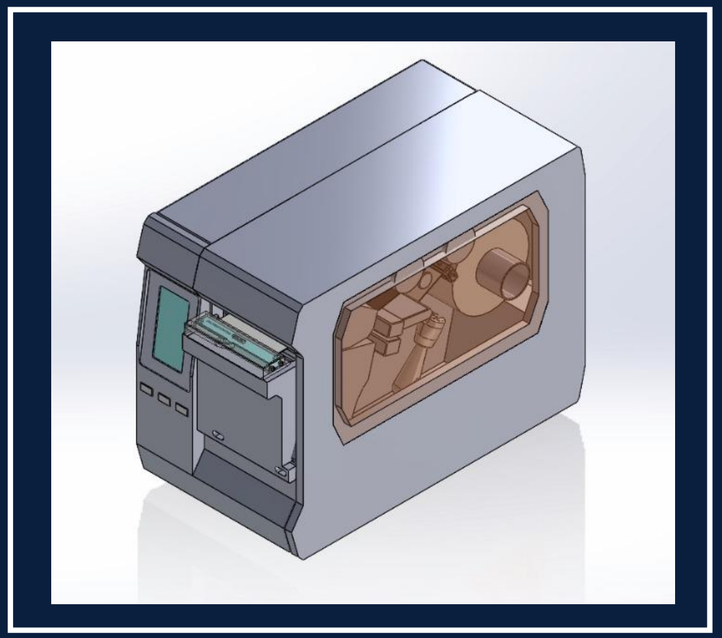
100% Label Inspection System

The fastest way to find and eliminate errors on labels and packaging — at full line speed, without compromise.

For technology & manufacturing

Singapore · Malaysia · Thailand

// LIVE INSPECTION



100%
COVERAGE

6 in/s
PRINT SPEED

Support·
Every major label printers

WWW.ZINCODE.NET · +60 37832 0255

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What's inside.

A walkthrough of the inspection platform — from challenges in the field to the hardware on your line and the ROI it delivers.

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WHO WE ARE

Industrial vision, built for the line.

Zincode Technologies delivers AIDC, RFID, machine vision inspection, deep learning application, label inspection and automated proofreading solutions across Southeast Asia.

We serve manufacturing, pharmaceutical, healthcare, automotive and logistics — combining deep regulatory knowledge with hands-on integration experience to help customers ship right, first time.

7
COUNTRY FOOTPRINT

5+
INDUSTRIES SERVED

100%
INSPECTION FOCUS

MEMBER OF

GS1 Singapore SOLUTION PARTNER

Agency for Science, Technology and Research SINGAPORE

Advanced Remanufacturing and Technology Centre A*STAR

FEATURED PROJECTS

2 local SMEs partner Rolls-Royce, A*Star

They have jointly developed a new technology that automates part of an inspection process in jet engine manufacturing. BY LEILA LAI

ROLSAROYCE, the Agency for Science, Technology and Research (A*Star) and two local enterprises have jointly developed a new technology that automates part of an inspection process in jet engine manufacturing.

System integrators Zincode Technologies and Systematic Global worked with Rolls-Royce and A*Star at the latter's Advanced Remanufacturing and Technology Centre (ARTC) on the solution, which uses an array of cameras and specialised lighting to capture detailed images of jet engine fan blades.

An integrated software algorithm then examines the images for minute hairline defects and highlights them on a computer screen for trained inspectors to assess.

It improves on the current process, which involves the inspectors

Gavin New, director at Systematic Global, agreed. "These projects increase our capabilities. We experience a learning curve through these projects, and we can evolve to our next phase."

Rolls-Royce appreciates how working with local companies allows for solutions to be developed and implemented more quickly, since there is no need to deal with overseas vendors and different time zones, and the multinational company benefits from the SME's perspective in such projects too, added Rolls-Royce's Dr Bhangu.

He said: "We didn't engage so actively with SMEs in the past, but we're finding that their agile approach, their new ways of developing solutions, are areas we can learn from as well."

ARTC chief executive David Low is encouraged by the results of the joint lab programme so far, and expects many more innovations to be developed and implemented in the coming years, benefiting the aerospace industry here overall. "If we can use technology to make our local established companies productive and competitive, it contributes to the whole system, where they can be profitable and justify staying in Singapore," Dr Low said.

"Companies worldwide will go to the place that makes sense and Singapore is a place with a higher cost structure, so we need to use technology to prove that it's worthwhile for them to stay."

(From left) Rolls-Royce's Dr Ricky Bhangu; A*Star's Professor Tan Sze Wee; ARTC's Dr David Low; Systematic Global's Gavin New; and Zincode Technologies' David Tan. ST PHOTO: YIN'S WONG JRS

Source: https://www.businesstimes.com.sg/sme/2-local-smes-partner-rolls-royce-astar

THE STRAITS TIMES

Saturday, February 17, 2024

SMEs to get more support to adopt green solutions

Timothy Goh

With more multinational companies aiming to curtail their carbon footprint and pressuring their suppliers to their suppliers, local firms can gain an edge by embracing sustainability.

This is why more support will be given to local small and medium-sized enterprises (SMEs) to adopt green solutions, Finance Minister Lawrence Wong said during his Budget statement on Friday.

"SMEs today sometimes still worry about the additional time, inspection, and cost, but going green can be a competitive advantage," he said.

DPM Wong, who is also Finance Minister, announced three enhancements to the Energy Efficiency Scheme (EFS), which enables Singapore businesses to access financing more readily across all stages of growth.

First, the minimum loan quantum under the EFS - SME Working Capital Loan will be permanently increased from $100,000 to $500,000. This will help SMEs to meet their increased working capital needs, especially when fuel prices remain elevated costs.

Second, the enhanced maximum loan quantum under the EFS - Term Loan of $10 million will be extended till March 31, 2025. This will support businesses' internationalisation efforts amid global economic uncertainties.

Third, support for domestic construction projects under the EFS - Project Financing will be extended till March 31, 2025, with a maximum loan quantum of $5 million. This will support local construction firms amid a challenging operating environment.

DPM Wong also announced enhancements to the Energy Efficiency Grant (EEG) which was introduced in 2022 for companies in the food services, food manufacturing and retail sectors.

The EEG will be extending the scheme to more sectors, including manufacturing, construction, marine, and land as data centers and their users.

Companies registered and operating in Singapore with at least 30 per cent local shareholding, at least one year of operations and annual sales turnover of not more than $500 million will be eligible for support.

The EEG scheme will also be enhanced to provide two tiers of support - a base tier to provide support for the purchase of eligible equipment up to a $20,000 cap, as well as an advanced tier to support companies that wish to make larger investments to drive deeper energy savings.

DPM Wong also noted that the Partnerships for Capability Transformation, or Pact scheme, will be enhanced to provide more capability training, internationalisation and corporate venturing.

Pact was first introduced in 2021 in 2001 and supports the likes of co-innovation and internationalisation projects.

"With the enhanced Pact, we aim to help companies to diversify their global supply chains, compete in markets abroad and grow to become industry leaders in their own niches," he said.

In his speech, he noted that local firms can partner multinational companies and leverage on Pact to pivot to help them grow quickly, but these companies have set high requirements and standards for firms that wish to supply to them.

"If we can use technology to prove to choose only local suppliers, firs we can, and we will, help Singapore enterprises to meet the high standards and to form win-win partnerships with MNEs.

DPM Wong highlighted the aerospace industry's high manufacturing standards, and how local firms drive aerospace giants such as Rolls-Royce to be highly selective in their supplier choices.

The local firms Zincode as a company that had levelled up to meet Rolls-Royce's standards.

Zincode's ability to improve its image processing capabilities with the support of the Smart Manufacturing Joint Lab - a collaboration between the Agency for Science, Technology and Research, Rolls-Royce and Singapore Aero Engine Services (SAESL) - helped it to prove a partner for inspection work at Rolls-Royce's manufacturing facility in Singapore.

"Zincode has now successfully captured new opportunities from other companies in the aerospace sector, and benefited from an increase in sales," DPM Wong noted.

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LEVELLING UP

We cannot force MNEs to choose only local suppliers. But we can, and we will, help Singapore enterprises to meet the high standards and to form win-win partnerships with MNEs.

DEPUTY PRIME MINISTER LAWRENCE WONG

Zincode director David Tan (left) and Agency for Science, Technology and Research staff discussing technologies related to aviation component defects and detection under the Smart Manufacturing Joint Lab. PHOTO: ZINCODE AND SMART MANUFACTURING JOINT LAB

Source: https://www.youtube.com/watch?v=v15XQCYf9Xs&t=85s

THE PROBLEM

Seven ways a label can cost you.

Manual checks miss what the human eye can't see at line speed. The downstream cost — recalls, rework, audit findings — is far higher than catching it at print.

01
Regulatory & compliance pressure
FDA, EU MDR, GS1, ISO — every jurisdiction adds to the rule set.

02
Misprinted or incorrect labels
Wrong artwork, wrong SKU, wrong language — caught only at the customer.

03
Missing texts & expiry data
Variable fields silently drop or print blank under press faults.

04
Barcode readability failures
Poor grades fail at the warehouse scanner — too late to fix.

05
"Right first time" pressure
Throughput targets leave no time for second passes.

06
Human inspection limits
Eyes fatigue. Sampling misses defects in unsampled rolls.

07
Product recall risk
One mislabeled lot can trigger a full recall — millions in cost, brand damage that lasts years.

WHY 100% INSPECTION

Realising customer goals, solved at the press.

A Customer goals

Increase productivity across the line.

Automate manual inspection workflows end-to-end.

Make operation simple for line staff.

Catch critical errors instantly — get to market faster, without compromising quality.

Sustainability through less wastage from undetected bad print.

B Solution overview

Combines all inspection types into one process — slashes inspection time.

Supports every major label printer.

Identifies defects while printing — not after.

Reads & grades barcodes to ISO 15415 / 15416 in real time.

Verifies OCR with user-defined accuracy thresholds.

Generates audit-ready inspection reports.

Label Inspection Features.

Barcode Reading

Inspects codes to determine if theyare "readable." No attempt ismade to grade according to anystandard.

Barcode Verification

Inspects any combination of 1D and2D codes and grades them using ISO 15415 / 15416. Overall ISO grade (0.0 – 4,0) will be displayed and option for user to set minimum passing score.

Optical Character Recognition (OCR)

"Reads" characters and reports the data content.

Number Validation

Verifies the expected order of any numerical series, detects duplicates and sequence errors, and matches variable numbers with external datafiles.

Data and Code Matching

Verifies encoded data that represents human readable information and ensures synchronicity of multiple fields within a label.

Error Detection (Alert Only)

On screen error is displayed on PC monitor and light tower alert upon detection of error.

Reporting

Verifies encoded data that represents human readable information and ensures synchronicity of multiple fields within a label.

Eight inspection modes, a single workflow, one operator.
Engineered to run unattended at line speed.

01 — 02 OF 09

Barcode reading & verification.

CAPABILITY 01

Bar Code Reading — 1D & 2D

Inspects codes to determine if they are **readable** . No grading attempted against any standard.

CAPABILITY 02

Barcode Verification — graded

Inspects 1D and 2D codes and grades them against **ISO 15415 / 15416** . Overall ISO grade (0.0 – 4.0) displayed with a user-set minimum passing threshold.

3.8/4.0 ISO 15416 · GRADE A

SPECIFICATIONS

MAX READABLE WIDTH	**4 in / 100 mm**	MAX WEB WIDTH	**5.7 in / 145 mm**
MAX PRINT SPEED	**6 in / second**	CODE ORIENTATION	**Any · multiple per label**
MIN 1D NARROW BAR WIDTH	**6.7 mil (0.169 mm)**	MIN 2D CELL SIZE	**10.0 mil (0.254 mm)**

03 — 04 OF 09

Blemish detection & OCR.

CAPABILITY 03 · MASTER ↔ LABEL

Blemish detection

Identifies print faults — smears, ribbon wrinkle, missing text or artwork — by comparing every label to a master.

PRINT FAULTS	**Smears, wrinkle, missing text**
VARIABLE DATA	**User-specified match zone**
LIGHT SOURCE	**Red 660 nm ***
MIN DEFECT SIZE	**30 mil (0.762 mm)**
MIN CONTRAST	**≥ 40% vs background**

* Red-spectrum colour blemishes may not be reliably detected.

CAPABILITY 04 · OCR

Optical Character Recognition

Reads characters and reports the data content — verifying alphanumeric strings (A–Z, 0–9) against a known field or database.

MIN READABLE WIDTH	**0.10 in (2.54 mm)**
MIN READABLE HEIGHT	**0.12 in (3.04 mm)**
BEST FONTS	**OCR-A · OCR-B · Semi**
CHARACTER SPACING	**No touching / overlap**
INTER-CHAR DIFFERENCE	**≥ 30%**

LOT 4829-A · EXP 2027-04 ✓ MATCH

05 — 08 OF 09

Validation, matching, alerts & reporting.

CAPABILITY 05

Number Validation

Verifies expected order of any numerical series, detects duplicates and sequence errors, and matches variable numbers against external CSV files. Ascending, descending, or algorithmic.

CAPABILITY 06

Data & Code Matching

Verifies that encoded barcode data matches its human-readable text, and ensures synchronicity of multiple fields within a single label.

CAPABILITY 07

Error Detection & Alerts

On-screen error display plus light-tower alert on detection. Optional IO can pause the printer upon error detection.

CAPABILITY 08

Reporting

Date, time, barcode data, match pass/fail, inspection pass/fail. CSV output by lot number — saved to your IT-specified network drive.

09 OF 09

Supports communication with MES system.

01

Production Job Download

MES sends label print information to label inspection system automatically.

Benefits:

- Reduces manual setup errors.
- Ensures correct inspection recipe / jobfile is loaded.

02

Automatic Recipe / Jobfile Selection

Based on MES job data, the label inspection system can automatically load the correct recipe / jobfile to run inspection.

Benefits:

- Faster job changeover
- Minimize operator intervention

03

Real-Time Inspection Result Reporting

The label inspection system sends back inspection information (Pass/Fail results; Defect counts; Barcode grades; OCR validation status; Reject statics) for re-printing process.

“MES integration enables the label inspection system to become part of the smart manufacturing ecosystem by providing real-time quality verification, traceability, and automated production control.”

ANNEX 01

Supported symbologies.

19 industrial symbologies covered out of the box — including all GS1 variants required for healthcare and pharmaceutical compliance.

14 1D CODES

5 2D & STACKED

LINEAR (1D)

- Code 39
- Code 93
- Code 128
- Codabar
- I 2 of 5 (ITF)
- UPC-A
- UPC-E
- EAN-8
- EAN-13
- GS1-128
- GS1-128 + CCA
- GS1-128 + CCB
- GS1-128 + CCC
- GS1-Databar Limited

2D & STACKED

- Data Matrix
- QR Code
- Aztec Code
- GS1-Databar-14
- GS1-Databar Stacked

HARDWARE

PC, control box, two systems.

An industrial PC connects to the control box; one PC runs up to two inspection systems. Customer supplies the AC mains.

CUSTOMER RESPONSIBILITY

Review installation checklist — networking and PC requirements.

Have IT available during installation for any PC or network changes.

Sign-off of installation at completion.

INDUSTRIAL PC SPECIFICATION

CPU	**Latest-gen Intel i7 (8 / 12 core)**
RAM	**32 GB**
STORAGE 1	**SSD · 1 TB (OS & software)**
STORAGE 2	**HDD · 1 TB (backup, images, reports)**
OPERATING SYSTEM	**Windows 10 IoT Enterprise (latest)**
EXPANSION	**1 × PCIe x4 slot**
USB	**5 × USB ports**
SERIAL	**2 × serial ports**
NETWORK	**2 × Ethernet ports**

POWER
PC + Monitor + Control Box
AC socket from customer

CAPACITY
1 PC → 2 systems
Parallel inspection lanes

SECTION 06

Software Overview.

A guided look at the inspection workspace — recipe/jobfile setup, live monitoring, summary reporting, audit trail, and calibration.

UI WALKTHROUGH

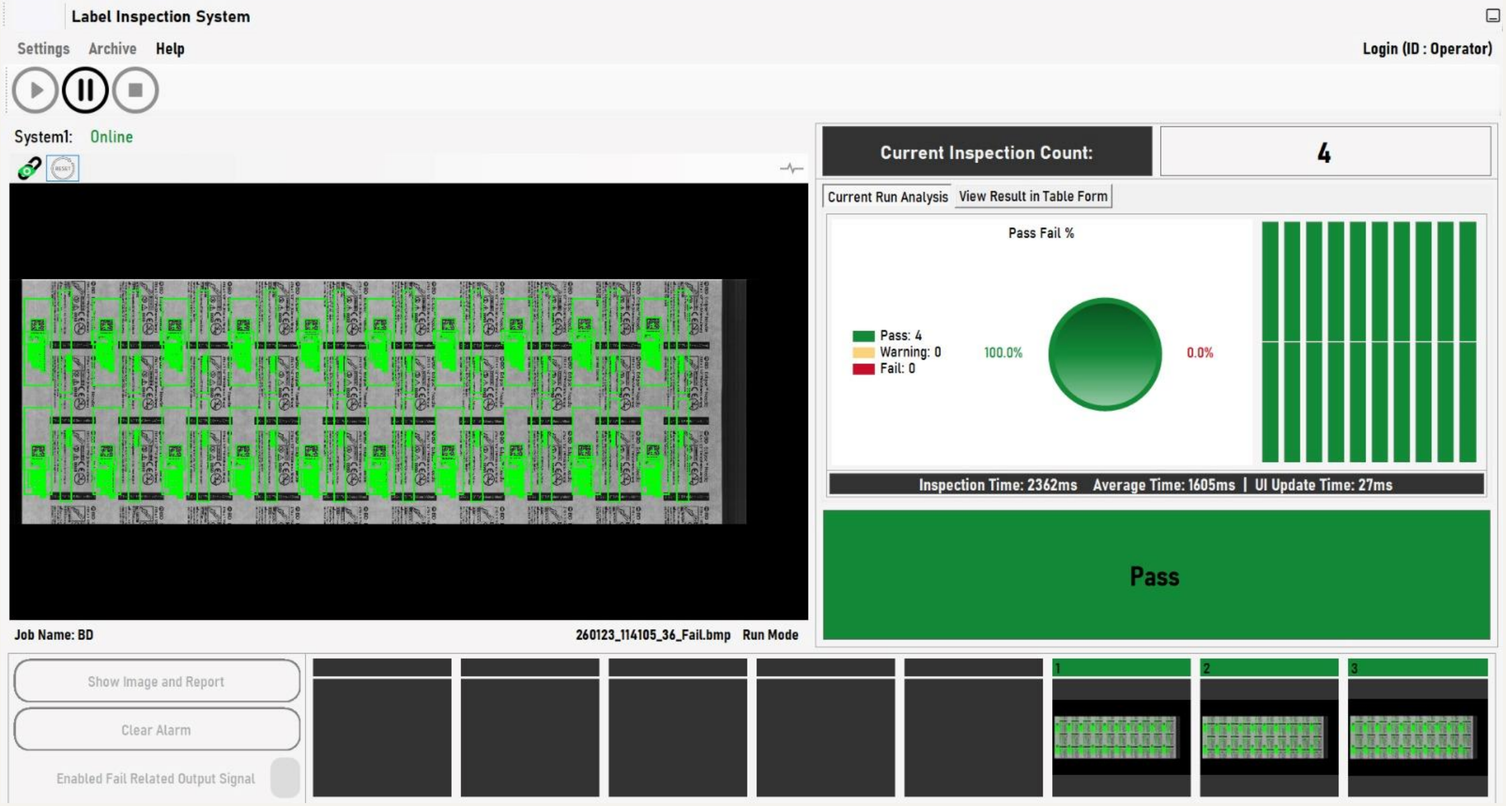
Software overview.

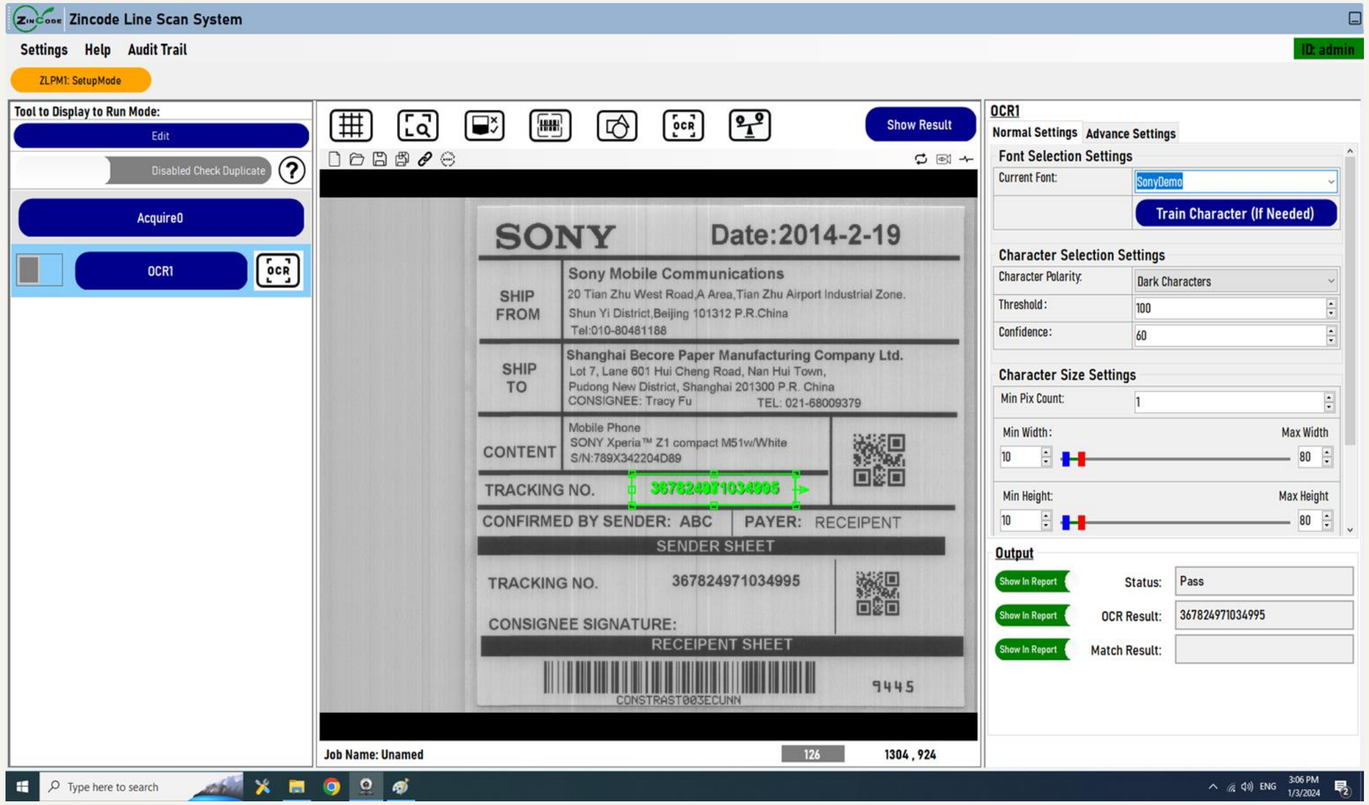
The operator's home screen — recipe / jobfile selection, live preview, and pass/fail counters. Designed for a single-touch start on the line.

Recipe / jobfile library with last-used quick-pick

Live label preview with overlay markers

Real-time pass / fail counters & trends





UI WALKTHROUGH

Inspection tools.

Drag-to-define inspection regions on the master label. Each region binds to a tool — barcode, OCR, blemish, pattern match.

- Barcode
- Verify
- OCR
- Match
- Number
- Blemish

UI WALKTHROUGH

Generate summary reports.

Export per-lot CSV reports including timestamp, barcode payload, match status, and inspection result. Save to a designated network drive.

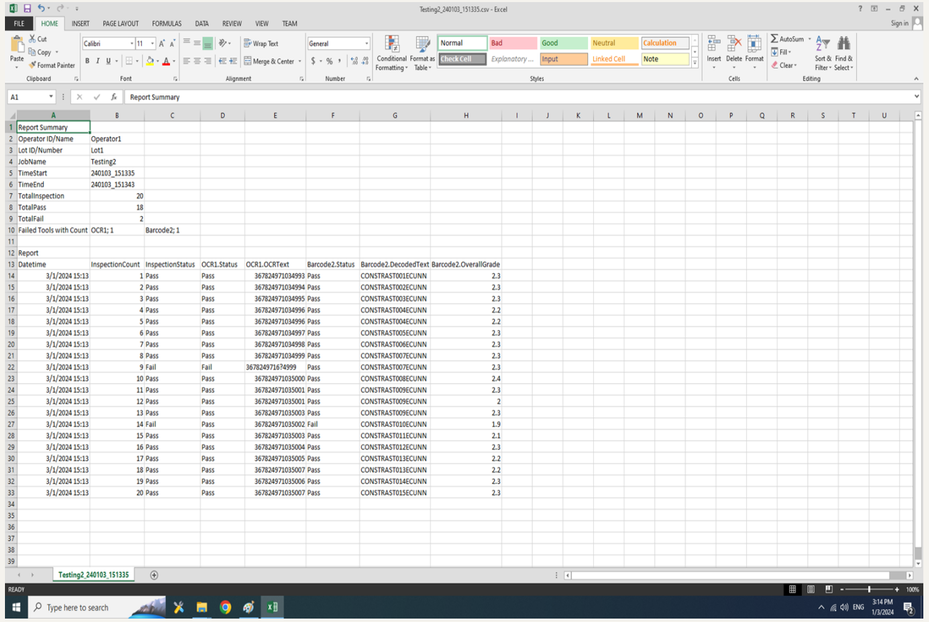
CSV

PDF

STANDARD FORMAT

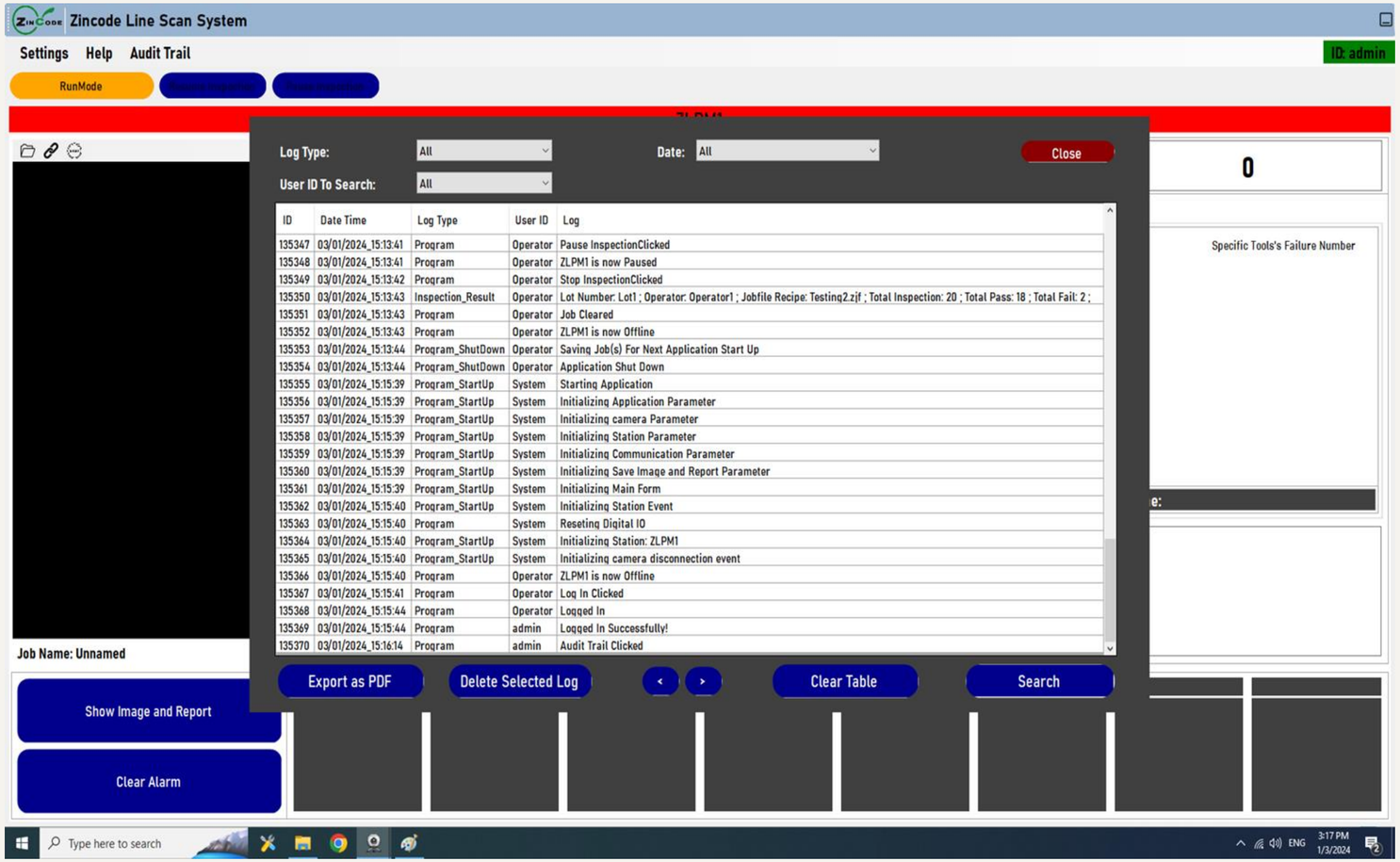
SMB

NETWORK DRIVE



Report Summary							
Operator ID/Name	Operator1						
Lot ID/Number	Lot1						
JobName	Testing2						
TimeStart	240103_151335						
TimeEnd	240103_151343						
TotalInspection	20						
TotalPass	18						
TotalFail	2						
Failed Tools with Count	OCR1; 1	Barcode2; 1					
Report							
Datetime	InspectionCount	InspectionStatus	OCR1.Status	OCR1.OCRText	Barcode2.Status	Barcode2.DecodedText	Barcode2.OverallGrade
3/1/2024 15:13	1	Pass	Pass	367824971034993	Pass	CONSTRAST001ECUNN	2.3
3/1/2024 15:13	2	Pass	Pass	367824971034994	Pass	CONSTRAST002ECUNN	2.3
3/1/2024 15:13	3	Pass	Pass	367824971034995	Pass	CONSTRAST003ECUNN	2.3
3/1/2024 15:13	4	Pass	Pass	367824971034996	Pass	CONSTRAST004ECUNN	2.2
3/1/2024 15:13	5	Pass	Pass	367824971034996	Pass	CONSTRAST004ECUNN	2.2
3/1/2024 15:13	6	Pass	Pass	367824971034997	Pass	CONSTRAST005ECUNN	2.3
3/1/2024 15:13	7	Pass	Pass	367824971034998	Pass	CONSTRAST006ECUNN	2.3
3/1/2024 15:13	8	Pass	Pass	367824971034999	Pass	CONSTRAST007ECUNN	2.3
3/1/2024 15:13	9	Fail	Fail	367824971674999	Pass	CONSTRAST007ECUNN	2.3
3/1/2024 15:13	10	Pass	Pass	367824971035000	Pass	CONSTRAST008ECUNN	2.4
3/1/2024 15:13	11	Pass	Pass	367824971035001	Pass	CONSTRAST009ECUNN	2.3
3/1/2024 15:13	12	Pass	Pass	367824971035001	Pass	CONSTRAST009ECUNN	2
3/1/2024 15:13	13	Pass	Pass	367824971035003	Pass	CONSTRAST009ECUNN	2.3
3/1/2024 15:13	14	Fail	Pass	367824971035002	Fail	CONSTRAST010ECUNN	1.9
3/1/2024 15:13	15	Pass	Pass	367824971035003	Pass	CONSTRAST011ECUNN	2.1
3/1/2024 15:13	16	Pass	Pass	367824971035004	Pass	CONSTRAST012ECUNN	2.3
3/1/2024 15:13	17	Pass	Pass	367824971035005	Pass	CONSTRAST013ECUNN	2.2
3/1/2024 15:13	18	Pass	Pass	367824971035007	Pass	CONSTRAST013ECUNN	2.2
3/1/2024 15:13	19	Pass	Pass	367824971035006	Pass	CONSTRAST014ECUNN	2.3
3/1/2024 15:13	20	Pass	Pass	367824971035007	Pass	CONSTRAST015ECUNN	2.3

Name	Field	Result
CPN	Status	Pass
CPN	DecodedText	15-108954-01
CPN	OverallGrade	4
CPN	DetailGrades	Overall Quality: 4; Decode: 4; Symbol Contrast: 4; Minimal Reflectance: 4; Minimal Edge Contrast: 4; Modulation: 4; Defects: 4; Decodability: 4; Additional Requirements: 4
ReferencePoint4	Status	Pass
CPN_OCR	Status	Pass
CPN_OCR	OCRText	15-108954-01
CPN_OCR	Qualities	80%; 80%; 80%; 80%; 80%; 80%; 80%; 80%; 80%; 80%; 80%; 80%
MPN	Status	Pass
MPN	DecodedText	M324R2GA3PB0-CWM
MPN	OverallGrade	2.4
MPN	DetailGrades	Overall Quality: 2.4; Decode: 4; Symbol Contrast: 4; Minimal Reflectance: 4; Minimal Edge Contrast: 4; Modulation: 4; Defects: 4; Decodability: 2.4; Additional Requirements: 4
MPN_OCR	Status	Pass
MPN_OCR	OCRText	M324R2GA3PB0-CWM
MPN_OCR	Qualities	80%; 80%; 80%; 80%; 80%; 80%; 80%; 80%; 80%; 80%; 80%; 80%; 81.03%; 80%; 80%; 80%
SerialNumber	Status	Fail
SerialNumber	DecodedText	80CE01261002D39C00
SerialNumber	OverallGrade	0
SerialNumber	DetailGrades	Overall Quality: 0; Decode: 0; Symbol Contrast: 4; Minimal Reflectance: 4; Minimal Edge Contrast: 4; Modulation: 4; Defects: 4; Decodability: 3; Additional Requirements: 3.6
SerialNumber_OCR	Status	Pass
SerialNumber_OCR	OCRText	80CE01261002D39C00



UI WALKTHROUGH

Audit trail.

Every operator action is logged — who, what, when. Built for regulated environments and 21 CFR Part 11-style review.

UI WALKTHROUGH

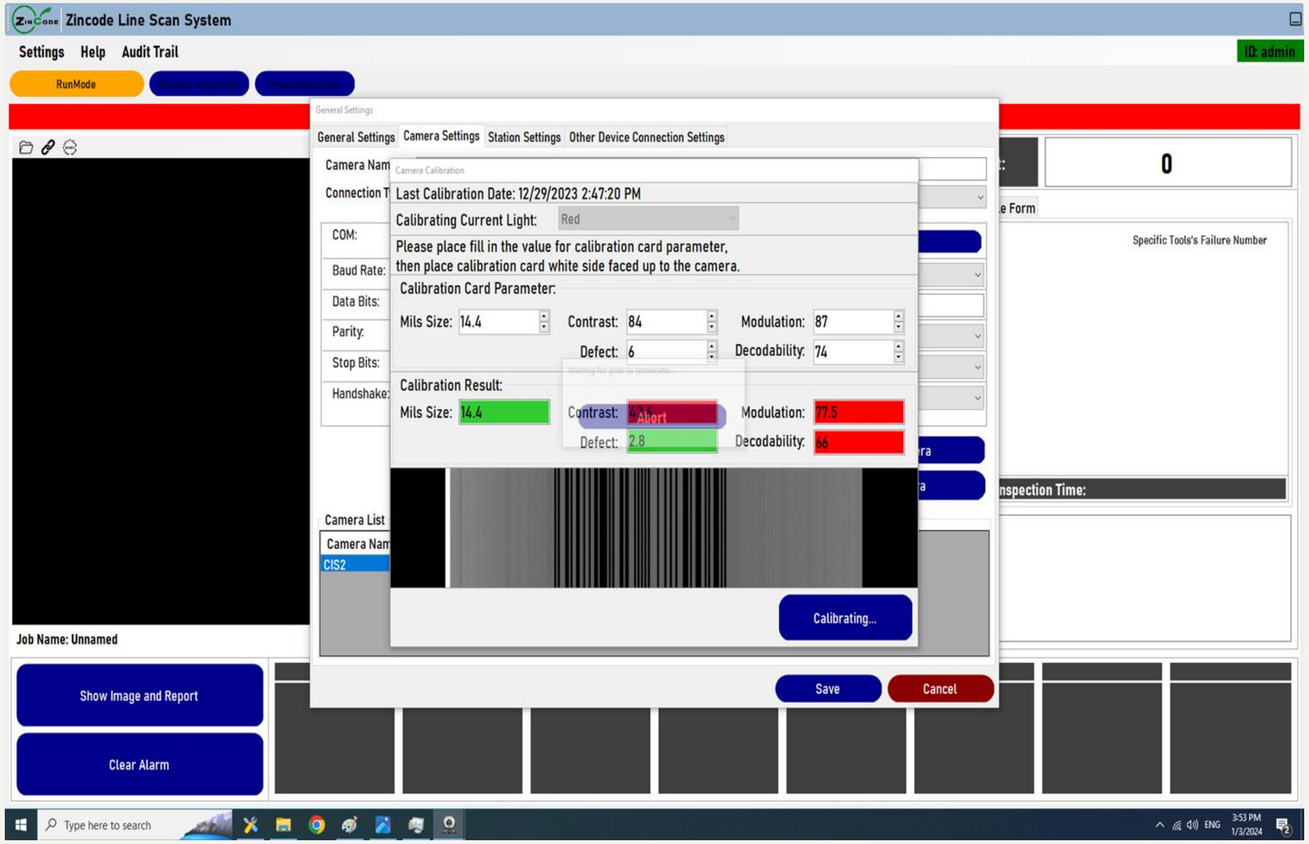
Calibration.

A guided routine for white balance, focus, and pixel-per-mm calibration. Run on shift change or when web width changes.

Step-by-step guided wizard

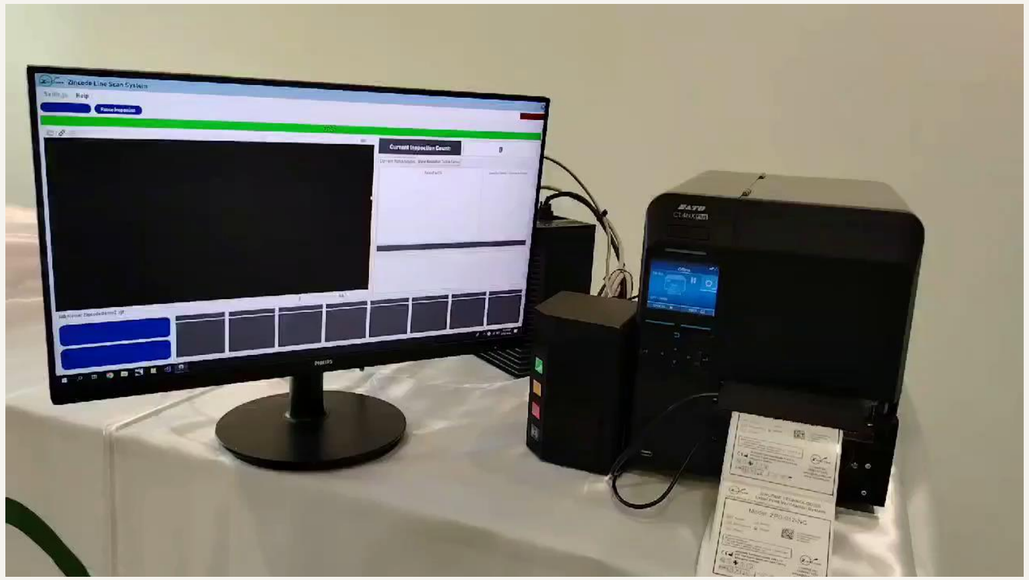
Logged in audit trail automatically

Recalibration reminder by run-hours



IN PRODUCTION

Sample application.



- Barcode Read
- Barcode Grade
- OCR Inspection
- Data Matching
- Blemish Detection

WHY LINE SCAN — 1 OF 2

Why a line-scan vision system beats multi-camera arrays.

ADVANTAGE 01

Uniform, distortion-free imaging

Telecentric by design — captures the web from 10–20 mm with self-contained lens and illumination. No parallax, no geometric distortion, no stitching artefacts.

ADVANTAGE 02

Simpler optical setup

Lens, LED illumination and sensor in one compact unit. Mechanically align several CIS bars to form a seamless continuous image — easy to maintain and calibrate.

ADVANTAGE 03

Consistent illumination

Built-in RGB or white LEDs deliver uniform brightness across the full width — no fall-off, no shadows, no zone mismatches.

WHY LINE SCAN — 2 OF 2

Higher density. Lower complexity.

ADVANTAGE 04

High resolution, smaller footprint

Achieve 600–1200 dpi with the sensor close to the web — no large optical path, no camera gantry, no vibration enclosure.

ADVANTAGE 05

Simplified synchronization

Captures one line at a time as the web moves; timing tied to web speed via encoder for perfect aspect ratio. No cross-camera trigger choreography.

ADVANTAGE 06

Cost & maintenance efficiency

One CIS replaces multiple cameras, lenses and lighting assemblies — lower hardware and maintenance cost. Sealed, compact bar; cleaning and calibration are simpler.

THE BOTTOM LINE

Why this pays back.

Eliminating mislabelled output at the labeling station is dramatically cheaper than catching it at QA, the warehouse, or the customer. The label inspection system pays back across four dimensions:

01 · QUALITY

100%

of every label inspected — not 1 in 50, not on a sample basis.

02 · SPEED

6 in/s

at full line speed — no throughput penalty.

03 · WASTE

↓

Defects caught at print — not after a full roll is wasted.

04 · RECALL RISK

↓↓

Audit-ready CSV reports and full audit trail per lot.

Area	**Estimated Annual Savings**
Labour Reduction	RM20,500 (Based on minimum wage in Malaysia)
Reduced Waste/Rework	RM15,000 (Based on 100,000 labels / month with 1% defect rate)
Downtime Reduction	RM12,000 (Based on 15-30 mins / day of downtime)
Recall Risk Avoidance	RM25,000 (Product recalls, regulatory penalties, shipment rejection, brand damage)
Total Estimated Savings	**RM72,500+/year *(Estimation)***
Estimated Payback Period	***~ 12 – 18 months***

LET'S TALK

Ready to inspect every label?

Book a demo with our solutions team — we'll review your current process and propose a deployment scoped to your throughput targets.

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TELEPHONE

www.zincode.net
WEBSITE

CAPABILITIES PORTFOLIO

- Deep Learning Machine Vision →
- Barcode Verifier & Fixed-Mount Readers →
- Inventory Tracking System →
- OCR for Document Processing →
- **Label Inspection System** •

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