

3D Solder Paste Inspection Machine (3D-SPI) /
3D Automated Optical Inspection (3D-AOI) Systems

3Si / 3Di-EX Series

Saki Corporation

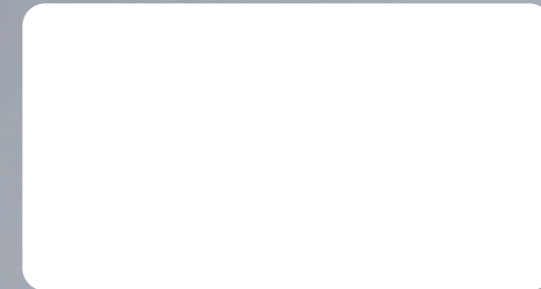


saki Saki Corporation

Headquarters Office
DMG MORI Tokyo Digital Innovation Center 3-1-4, Edagawa, Koto-ku, Tokyo, 135-0051, Japan
Tel. +81-3-6632-7910 Fax. +81-3-6632-7915

Nagoya Office
DMG MORI Nagoya Head Office 4F, 2-35-16 Meieki, Nakamura-ku, Nagoya-shi, Aichi, 450-0002, Japan
Tel. +81-52-587-1853 Fax. +81-52-587-1854

West Japan Office
345-1 Idono-cho, Yamato-Koriyama City, Nara, Japan



Introducing Saki's New Top-of-the-Range SPI / AOI

In today's electronics manufacturing, precision, reliability and repeatability in inspection are no longer optional - they're essential.

Saki has elevated its SPI/AOI systems to a new level of performance by combining its signature rigid gantry design with upgradable modular construction options.

By adapting to industry trends and aligning with customer needs, Saki ensures ongoing innovation, focusing on enhancing inspection capabilities through optical unit upgrades.



3Si / 3Di-EX Series

Upgrade to EXcellence

Eco-friendly & Sustainable



- Saki's powerful feature: Durable hardware combined with a modular structure designed for long-term use.
- Adoption of a common SPI/AOI gantry offering shared service parts.
- Expandable options selectable according to inspection needs.
- Reduced power consumption with an energy-saving mode, contributing to environmental sustainability.

Usability



- Unified user interface across SPI, AOI, and AXI devices.
- Increased work efficiency for inspection programs creation.
- Enhanced production with AI-AOI, reducing reliance on operator skill.
- Unified inspection processes for SPI, AOI, and AXI, providing a single Multi-Process View (MPV) result on one screen.
- Improved simplicity and integrity with newly developed hardware.

Connectability



- Automate your entire production line with M2M solutions that interact with printers and pick-and-place machines.
- Saki Link function connects SPI, AOI, and AXI to improve productivity.
- Eliminate process duplication with One Programming for shared SPI/AOI inspection programs.

Quality First: Unique SPI/AOI hardware

Made in Japan: With our 'Quality First' philosophy, we assemble and manufacture all products in our Nara factory in Japan to ensure superior validated quality across our range, from SPI to AOI and AXI.

Common SPI / AOI Features

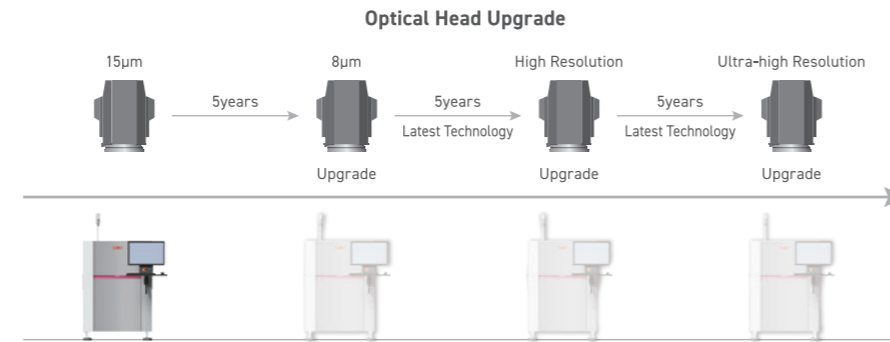
Rigid gantry structure provides accurate measurement



Common SPI / AOI Features

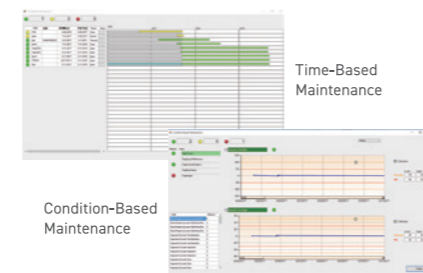
Upgradeable Hardware Design

Saki's distinctive concept allows optical head module replacement even after decades of use, enabling adaptability to changing inspection needs.^{※1}



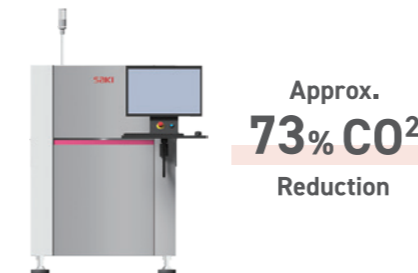
Self-Diagnostic System

Saki's predictive and preventive maintenance management system ensures stable machine conditions and consistent performance.



Energy-Saving Mode

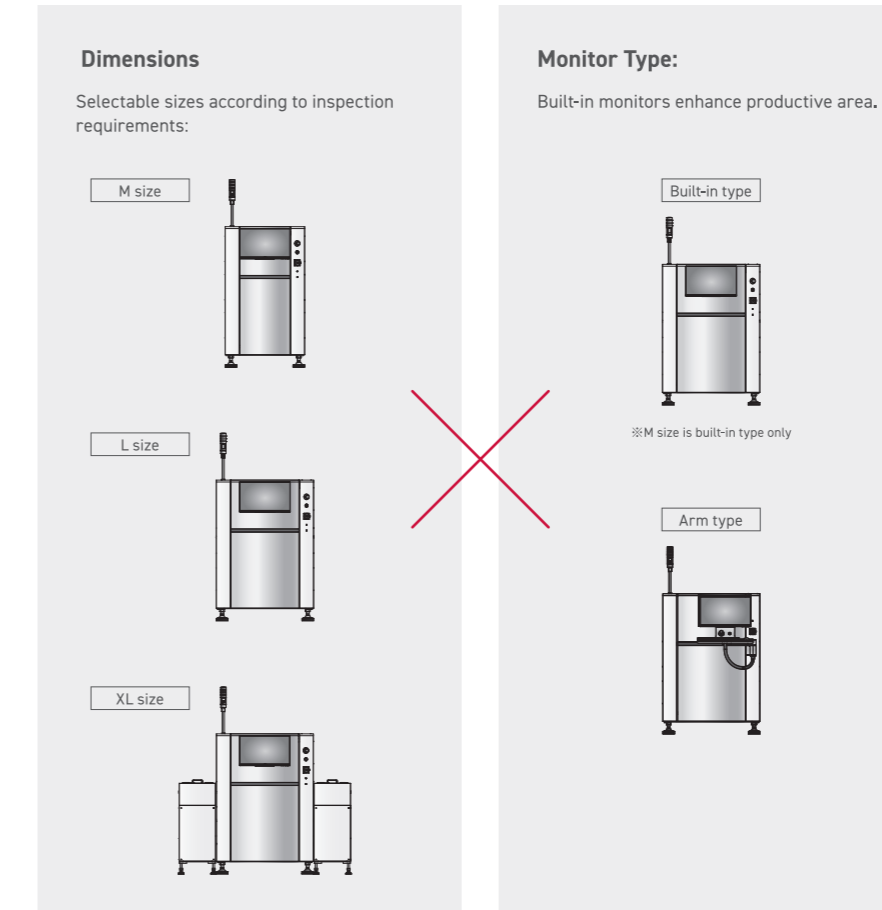
Automatically switches to energy-saving mode during standby to reduce power consumption, potentially reducing CO2 emissions by approximately 73%.



※1 Required for full optical head replacement during upgrades. Individual extensions, such as camera resolution, side cameras, and LED lights, cannot be replaced individually.

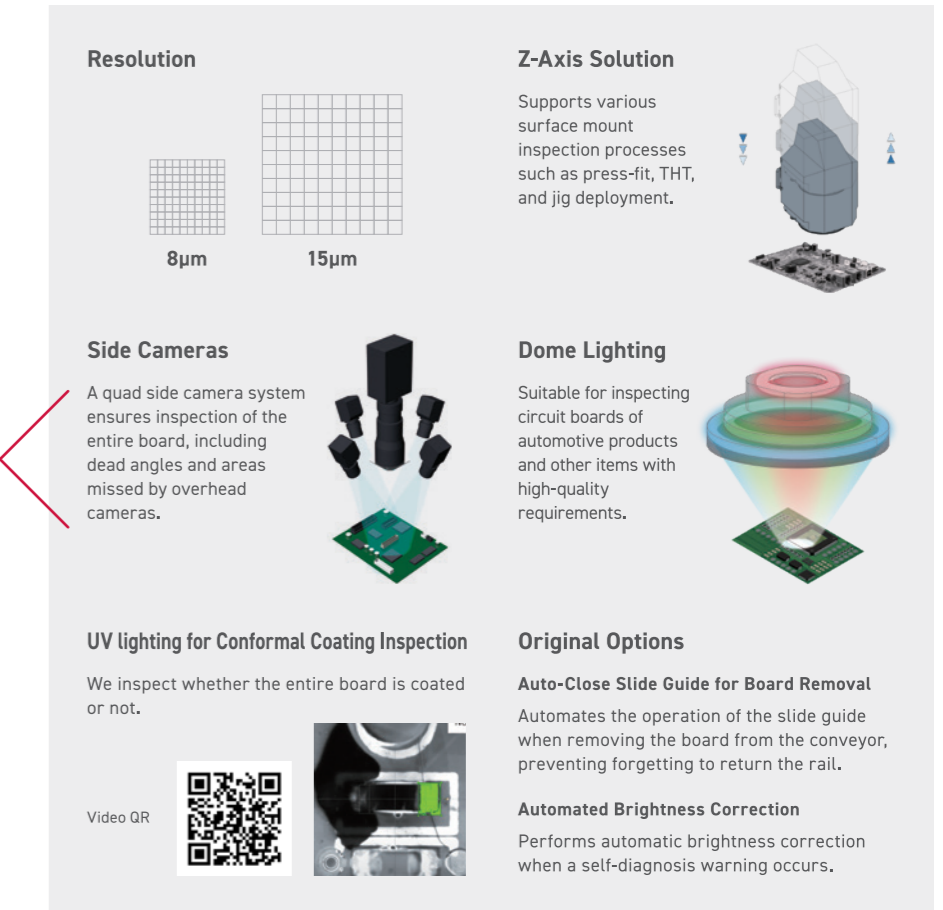
Common SPI / AOI Features

Modular Structure Customizable to Fit Inspection Needs



AOI

Expandable Items Selectable Specific to Inspection Needs^{※2}



※2 Factory-installed options are available for extension items.

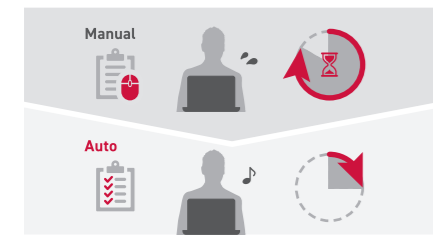
For details, refer to page 13. ➡

Leverage Saki's Unique and Superior Software for Accurate Inspection

Our core technology, Full Memory Technology system, is universal across our range of SPI, AOI, AXI solutions. Implementing proprietary high-speed processes with multi-core processing provides unique inspection solutions.

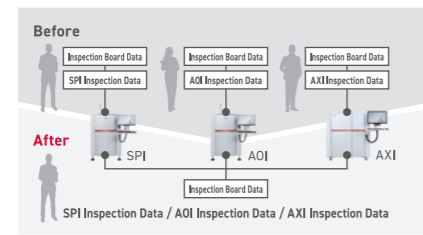
Easy Programming

- Cut programming time and effort with automated inspection program development tools
- Eliminate programming errors with comprehensive automated data integrity checking



One Programming

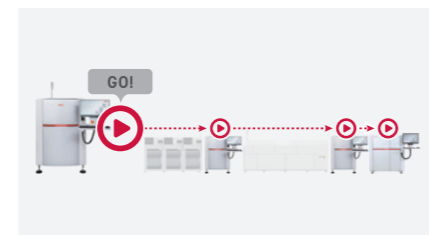
Standardized inspection program data for SPI, pre-AOI, and post-AOI, eliminates duplicate tasks and reduces line setup time to approximately one-third.



Saki Link Makes Automatic Changeover Possible.

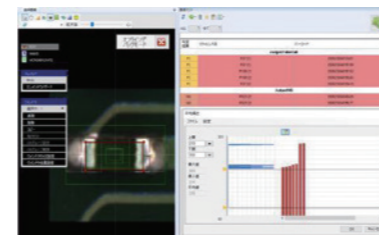
The necessary setup tasks for each device (such as starting automatic operation) can be completed in a single step when using Saki's inspection machines, reducing the burden on operators.

For details, please turn to pages 10 and 11 ➡



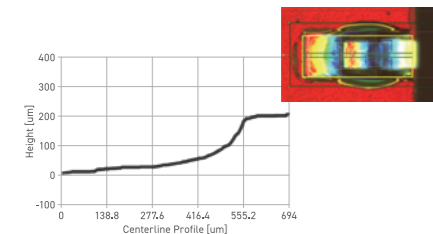
Offline Debugging

In a mass production environment, this feature visualizes operator assessment results (false calls, NG) and adjusts inspection parameters accordingly.



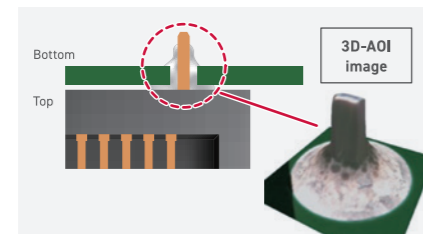
Solder Fillet Inspection

"Fillet Shape" Solder Inspection Algorithm supports the inspection of various types of components and enables solder fillet inspection in compliance with IPC inspection standards.



THT Solder Inspection

The FUJIYAMA solder inspection algorithm has been upgraded. In addition to the inspection of pins, holes, and solder fillets, further functions now also inspect for overabundance or shortage of solder.



Full Surface Inspection for Foreign Objects & Solder Balls

This feature detects foreign bodies and fallen objects across the entire board. With the latest software, solder ball detection tests can be conducted across the entire board simultaneously with normal foreign object inspection.



3-in-1 Feature

The '3-in-1' feature allows the SPI software to run on the AOI, enabling its use as an SPI.

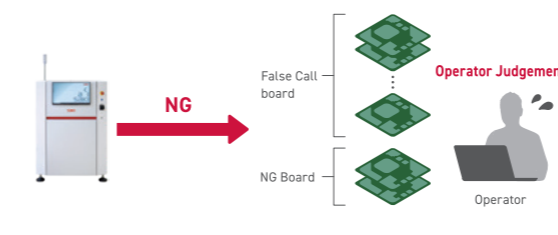


Saki's AI Solutions

AI Assist: Uses AI to re-assess, reducing operator workload.

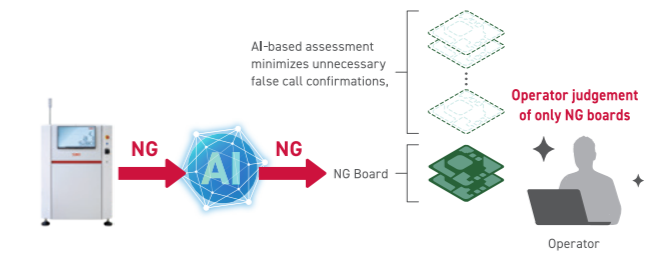
Before Deployment

Operators have to verify each component flagged as NG (No Good) by the inspection machine, which can be labor-intensive and is prone to errors and misjudgment.



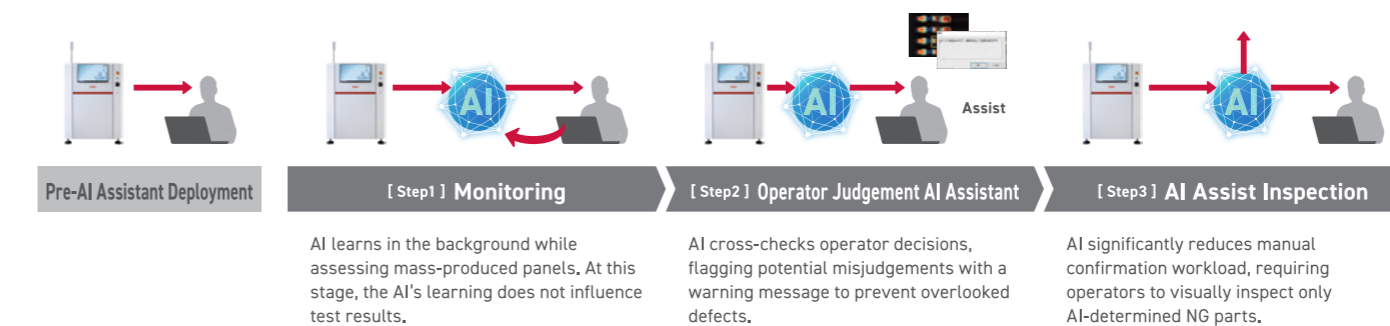
After Deployment

AI performs a second assessment on parts marked NG, drastically reducing the operator's workload by requiring manual verification only for AI-determined NG parts. This system helps prevent overlooked errors caused by misjudgment.



Steps to Deploy Saki's AI Assistant:

AI Assist is implemented in three stages, ensuring a low-risk and highly reliable AI judgement process:



AI learns in the background while assessing mass-produced panels. At this stage, the AI's learning does not influence test results.

AI cross-checks operator decisions, flagging potential misjudgements with a warning message to prevent overlooked defects.

AI significantly reduces manual confirmation workload, requiring operators to visually inspect only AI-determined NG parts.

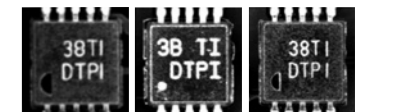
AI Inspection (AI OCR)

Challenges in Character Inspection

Traditional matching-based character inspection struggles with inconsistencies due to variations in print position, uneven surfaces, part substitutions, and variations in manufacturer markings.

Saki's AI OCR Solution

AI OCR detects and recognizes characters dynamically, enabling stable testing regardless of print misalignments



It overcomes discrepancies from different part manufacturers.

Benefits of AI inspection

AI-driven inspection minimizes dependence on operator expertise, bridging the skill gap and ensuring consistent inspection quality. By enhancing system robustness and standardizing inspection processes, it helps address the challenges posed by skilled labour shortages.

QUALITY-DRIVEN Production

Saki's Total Smart Factory Inspection Solution

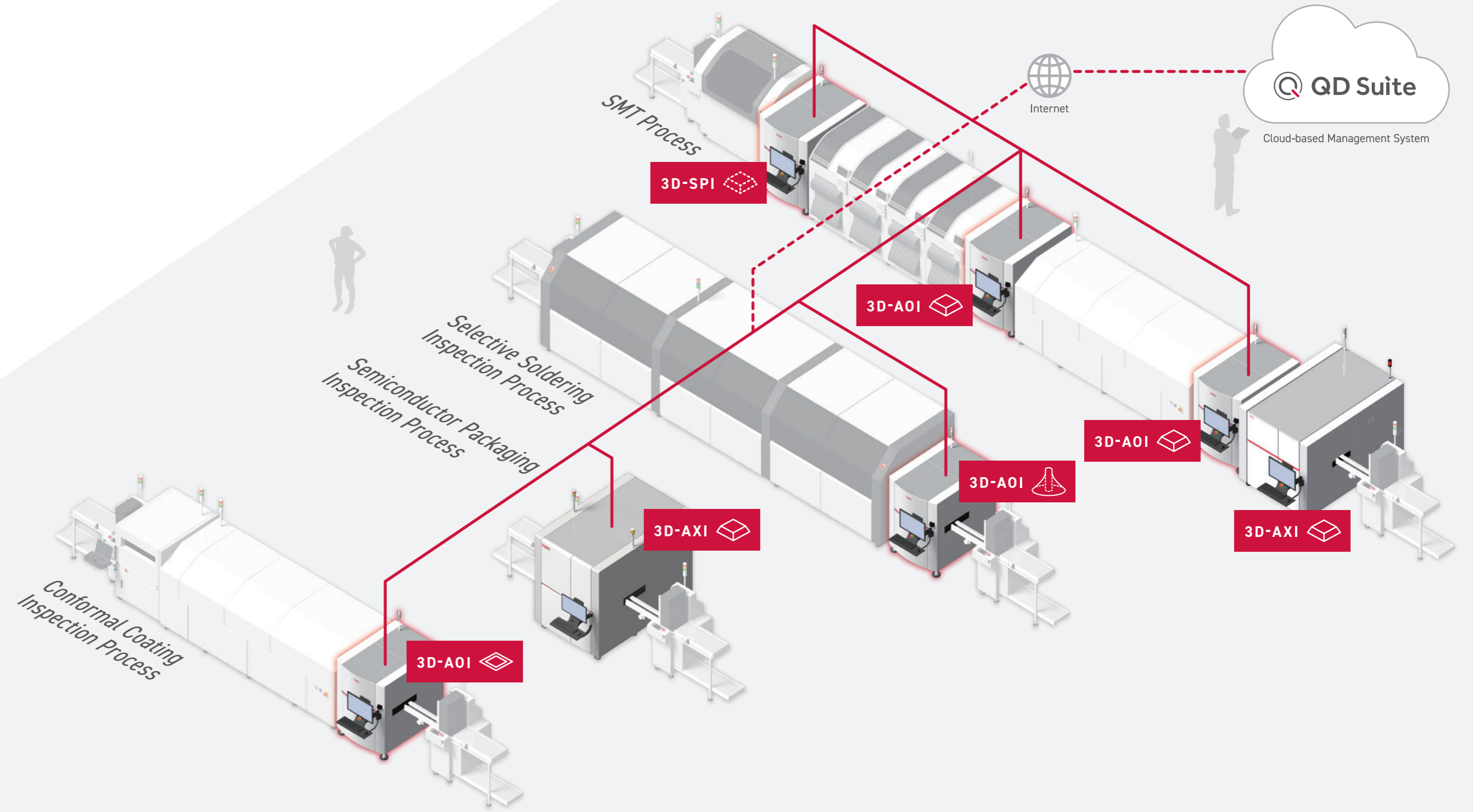
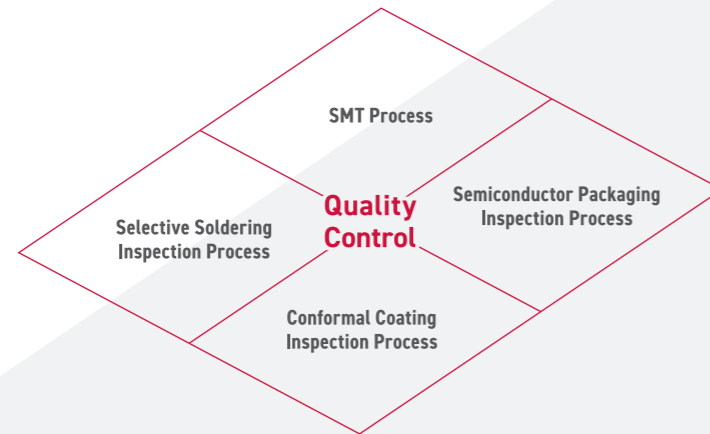
Saki maximizes production efficiency by enhancing quality throughout the production line.

Today's electronics manufacturing requires advanced inspection capabilities to handle high-mix, low-volume production, precision quality, shorter lead times, and reduced total cost of ownership. Saki's high-speed, high-accuracy SPI, AOI, and AXI solutions - enhanced with robust software and hardware - deliver the reliability needed for the modern Smart Factory. Saki's advanced data capture and machine-to-machine (M2M) connectivity optimize production efficiency, driving the Smart Factory forward.

Advantages of Saki's Total Inspection Solutions

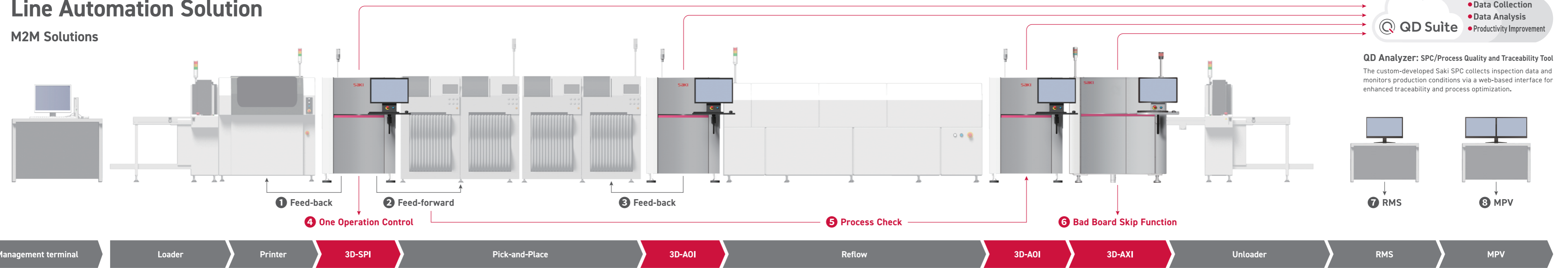
Saki inspection systems optimize quality control across the entire PCB assembly process:

- Screen printing
- Component placement
- Selective soldering
- Dispensing
- Reflow
- Conformal coating



Line Automation Solution

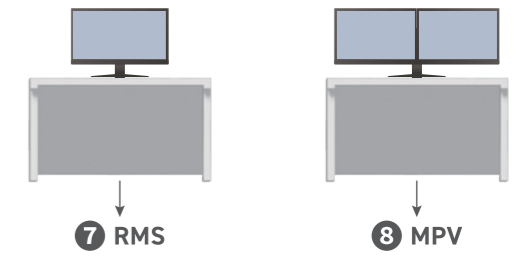
M2M Solutions



QD Suite

- Data Collection
- Data Analysis
- Productivity Improvement

QD Analyzer: SPC/Process Quality and Traceability Tool
 The custom-developed Saki SPC collects inspection data and monitors production conditions via a web-based interface for enhanced traceability and process optimization.



Inter-device Coordination With Other Companies

1 Feed-back

[SPI >>> Screen Printer]
 SPI feeds back misalignment data, preventing print errors and triggering automatic stencil cleaning alerts.



Automatic cleaning instructions

2 Feed-forward

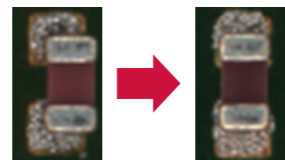
[SPI >>> Pick-and-Place Machine]
 SPI measures printing position shifts to correct placement positioning, ensuring accurate component mounting. The NG board skip function improves efficiency, quality, and cost.



NG board skip

3 Feed-back

[AOI >>> Pick-and-Place Machine]
 AOI M2M connectivity enables real-time placement correction with the placement machines.



Placement position correction

Saki Link – Seamless Coordination Between Saki Devices

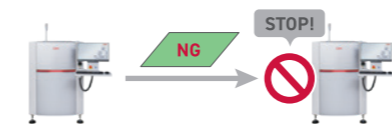
4 One Operation Control

Load a single inspection program to start/stop all connected devices automatically.



5 Process Check

Prevent defective boards from moving to post-processing; if an upstream inspection machine flags a board as NG, it is marked as an "Operation Error."



6 Bad Board Skip Function

Reduces X-ray inspection time by sharing AOI inspection results with the X-ray system, enabling bad-marked boards to be skipped.

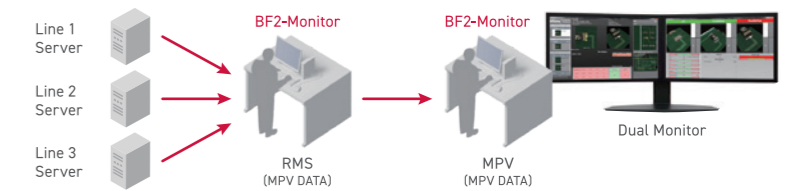


Options

BF2-Editor (Develop and debug inspection data offline)
 BF2-Monitor (Offline Verification Terminal)

7 RMS (Remote Management System)

Remotely control multiple BF2-Monitors from a single PC, reducing production floor personnel while monitoring real-time device status.



8 MPV (Multi Process View)

Displays results from all inspection stages (SPI, Pre-Reflow AOI, and Post-Reflow AOI) in a single real-time interface, allowing comparison and preventing defect outflow.

3Si / 3Di-EX Series Product Specifications

	3D-SPI			3D-AOI		
	M	L	XL	M	L	XL
Dimensions						
Model Name	3Si-MS3EX	3Si-LS3EX	3Si-ZS3EX	3Di-MS3EX	3Di-LS3EX	3Di-ZS3EX
Resolution	8 / 15 μm					
Image Capture Time	6,400mm ² /s / 8,000mm ² /s			4,500mm ² /s / 7,000mm ² /s		
Image Capture Speed with Z-Axis option ^{※1}	—			4,500mm ² /s / 6,400mm ² /s		
3D Height Measurement Range	500μm			40mm ^{※1}		
PCB Size (mm, in.)	50 × 60 ~ 330 × 330	50 × 60 ~ 510 × 510 ^{※2}	50 × 100 ~ 686 × 1016 ^{※3}	50 × 60 ~ 330 × 330	50 × 60 ~ 510 × 510 ^{※2}	50 × 100 ~ 686 × 1016 ^{※3}
PCB Clearance	Top : 40mm / Bottom : 60mm ^{※4}					
Electric Power	Single Phase ~ 200-240V+/-10%, 50/60Hz					
Air Requirement	0.5 MPa @ ≥5L/min (ANR)					
Noise Level	60 dB (A)					
PCB Weight	12kg		15kg	12kg		15kg
Weight	850kg	900kg	980kg	850kg	900kg	980kg

※1 25 mm (0.98 in.) or less when optional Z-Axis is not used.
 ※2 For dual mode, the PCB Size is 50 × 60 ~ 320 × 510 (1.97 × 2.36 ~ 12.60 × 20.07)
 ※3 An expansion to 60 inches (686 × 1524) is optional.
 ※4 For dual mode, the PCB Clearance Bottom is 50mm (1.96 in.).



Size

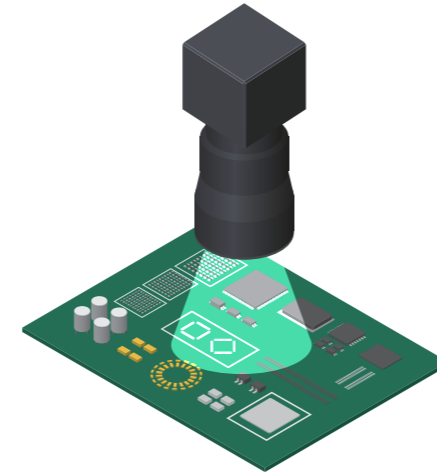
M built-in monitor type	L built-in monitor type	XL built-in monitor type	L arm type monitor	XL arm type monitor
Front View (mm, in.) 	Front View (mm, in.) 	Front View (mm, in.) 	Front View (mm, in.) 	Front View (mm, in.)
Side View (mm, in.) 	Side View (mm, in.) 	Side View (mm, in.) 	Side View (mm, in.) 	Side View (mm, in.)

※M is built-in type only

3Di-EX series Extension Optical Head Specifications

Saki offers tailored camera configurations, balancing resolution and image capture speed to suit specific production needs.

※factory-installed option



Resolution	8μm	15μm
3D Height Measurement Range	40mm (with Z-axis option)	
Image Capture Time	4,500mm ² /s	7,000mm ² /s ※1

※1 with Z-Axis option: Approx. 6,400 mm²/sec

Optical Options

Lighting Choice	Z-Axis Solution	Quad Side Camera System	UV Lighting for Conformal Coating Inspection
<p>Dome lighting image</p>			
<p>Ring Lighting A compact, three-stage lighting system for general-purpose inspection across a broad range of criteria.</p> <p>Dome Lighting Enhances color contrast in non-flat areas, ideal for automotive and other high-quality, high-reliability applications.</p>	<p>Extends 3D measurement and 2D focal range up to 40mm. Enables 2D and 3D inspection of taller components and text recognition. Supports THT, press-fit, and PCB inspection in jigs, broadening inspection capabilities beyond SMT assembly.</p>	<p>Enhances inspection capabilities for connectors, RF shields, QFN and J-lead components. Improves detection of solder-joint and solder-bridge defects that are difficult to spot using top-down cameras.</p>	<p>Detects whether the entire PCB has been coated. Simultaneously identifies foreign materials, ensuring superior inspection quality.</p>

Global Network

