



Global Network

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Faster, Taller and Sharper



3D Automated Optical Inspection

New 3Di Series

saki Saki Corporation

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<https://www.sakicorp.com/en/>

Saki's new technology for the industry's fastest and highest performance inspection

In response to today's rapidly changing market, Saki inspection systems accommodate the widest range of PCB assemblies and componentry. These include those with extreme density, the industry's smallest and tallest components in SMT process, and even those components small to tall neighboring each other. The systems deliver unmatched resolution and clarity for even the smallest components.

In addition to application range and image clarity, cycle time is significantly reduced. Expanded system options and enhanced flexibility handle the broadest application range and complexities to meet today's and tomorrow's needs for high quality assembly and productivity.

Visit our website for more details!



High-resolution camera system for densely populated assembly and extremely smaller packages

The advanced camera system enhances quality assurance when tackling complex inspection targets such as closely spaced components and ultra-small packages. The extremely high-definition image, being also sharply focused, delivers an enhanced inspection solution for tiny components such as 0402mm or 0201mm, fine-pitch ICs and closely spaced pads. The interchangeable camera allows upgrading to higher resolution on-site, in extremely short time.

Balancing high resolution and extended height-measurement range

In general, high-resolution inspection offers only limited height-measurement range. Our new camera system overcomes the challenges and provides both high-resolution inspection and inspection of taller components. In combination with the Z-axis option, the height-measurement range can be further extended up to 40mm. This option expands the standard machine specification beyond basic SMT requirements to address the quality-assurance challenges of through-hole devices, press-fit components, and PCB-on-jig inspection.

The fastest cycle time when performing 3D measurements for all packages

Speed is every bit as important as inspection performance. The latest high-resolution cameras capture much greater quantities of image data, which can lead to cycle time delays. Saki's inspection machine leverages highly optimized software, developed completely in-house, to achieve the industry's fastest cycle time for AOI systems with 8μm and 15μm resolution. The system minimizes unnecessary waiting time parallelizing image capture, processing, and inspection. In addition, the adoption of a high-rigidity frame that boasts superior stop-position accuracy enables high-speed movement of the optical head.

High-resolution 3D Soldering inspection

Inspecting solder joints, with their various contours and fillet shapes, is known to be difficult to assess yet essential for quality assurance. Saki's unique soldering inspection algorithm improves inspection performance accuracy of pass or failure based on soldering fillet shape and wetting height. The sharper high-resolution images from the new camera system, with the new dome lighting system that enhances visibility of the surface shape, helps inform accurate operator judgements.

Image by new camera



Image by conventional AOI

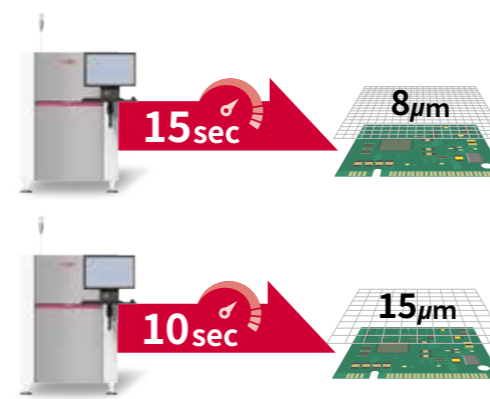
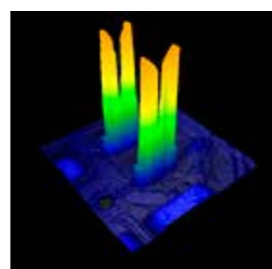


Board provided by: FUJII Co., Ltd. 0201mm component

Tall component in SMT process



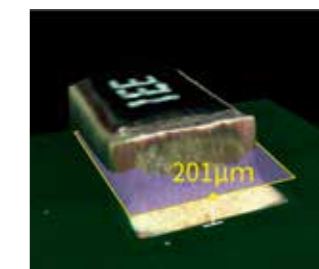
Press fit component



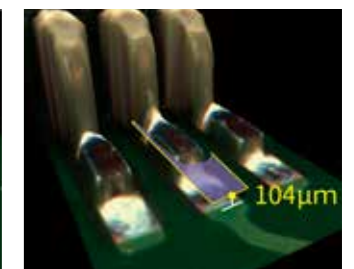
* Total time for image capture and inspection with Saki's sample board in A5 size (150mm x 214mm).
* The inspection time may vary depending on the inspection condition.

Soldering detected image

Chip component



IC component



Saki's Unique Technology to Realize Absolute Quality Assurance

Key Factor 1 Advanced Hardware Features

Proprietary Hardware provides accurate measurements

Realizing improvement of quality assurance and productivity

A closed-loop, dual servo-motor drive system, high-resolution linear scale, and rigid gantry structure provide unsurpassed accuracy and repeatability for absolute measurements. This hardware, made to last, delivers enduring precision for a superior return on investment with low ownership costs. In addition, an optimized conveyor system, with stopper-less position control driven by stepping motors, enables fast PCBA loading and unloading.



Linear scale image



Self-diagnostic System

Saki's predictive and preventive maintenance management system assures stable machine conditions and repeatable, consistent performance. Every key component is monitored along with system conditions, and a detailed diagnostic log is recorded. The optimized preventive maintenance plan reduces maintenance time, machine down-time, manpower, and costs.



Time Based Maintenance

Condition Based Maintenance

Optical Unit

Multi-frequency digital projectors enable accurate 3D measurements and enable the system to detect even the most elusive defects such as non-wetting. These new camera systems are quickly interchangeable between 8µm and 15µm on the factory floor, thus enhancing flexibility to configure the machine optimally for various jobs. In addition, the Coax Press standard camera enables extremely high-speed inspection. Enhanced 2D and 3D calibration uses multiple calibration height targets for positive and negative heights to ensure accurate height measurement.



Side Cameras *factory-installed option

A quad side camera system ensures inspection of the entire board, including dead angles and areas missed by overhead cameras.



TOP Camera Image



SIDE Camera Image



Advantages of the new Z-axis package for the 3Di Series: *factory-installed option

- Extends maximum height-measurement range up to 40mm;
- Enables accurate inspection for press-fit components and height inspection of taller parts with recognition of topside markings including letters and other optical characters;
- Provides accurate inspection and automated handling of PCBs mounted in pallets and fixtures;
- Superior height-measurement accuracy with real-time automatic warpage compensation.



Key Factor 2 Advanced Software Features

Programming

Shorten start-up time and improve production efficiency

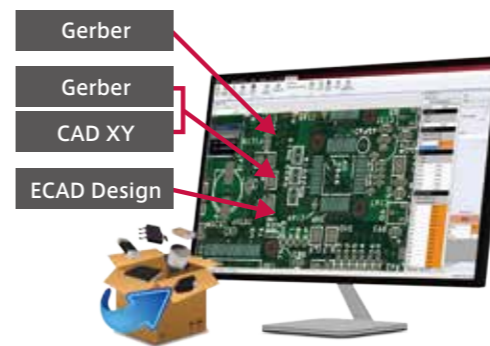
Common Platform

Saki's special BF2 software platform has a common user interface for all 3D SPI, AOI, and AXI systems. The software saves a full 3D image of the whole PCBA, so the operator can create inspection data without using the physical board.



Saki Self-Programming (SSP) Software

Saki's Self-Programming Function was developed on the concepts of Board less, Skill less, and Stress less. Inspection data can be easily created by using various PCB design data in addition to Gerber data and CAD data.



Inspection Data per IPC Standards

The default thresholds of inspection data conform to IPC standards.

Name	Value	OK Range	NG Type
Unit	0.001mm	0.001 - 0.001	
Unit	0.001mm	0.001 - 0.001	
Unit	0.001mm	0.001 - 0.001	
Unit	0.001mm	0.001 - 0.001	
Unit	0.001mm	0.001 - 0.001	
Unit	0.001mm	0.001 - 0.001	
Unit	0.001mm	0.001 - 0.001	
Unit	0.001mm	0.001 - 0.001	
Unit	0.001mm	0.001 - 0.001	
Unit	0.001mm	0.001 - 0.001	



Measurement Inspection and Tuning Function

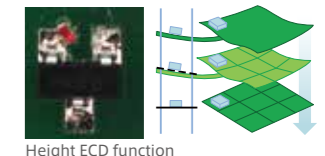
Offline Debugging

Optimization of the inspection libraries without stopping the production lines saves debugging time. Re-inspecting boards using previously saved OK and NG images minimizes false calls and ensures high detection capability.



Warpage Adjustment

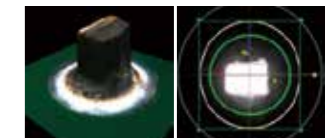
Warpage is compensated automatically. An accurate height map is made of the entire PCBA surface, enabling the Extra Component Detection function to detect foreign material.



Height ECD function

Fujiyama (Through-hole Device Solder Inspection)

The Fujiyama algorithm provides complete through-hole joint inspection in a single step. It simultaneously inspects for copper exposure, pin detection, pin-holes, solder fillets, and bridges.



3D DIP Soldering

Inspection Data Verification

History Management System

The History Management System records the detailed data modification system in detail (who, what, when, where, why, and how)



Golden & Silver Sample Check Function

Maintains inspection accuracy by checking machine status and inspection conditions before starting auto operation.



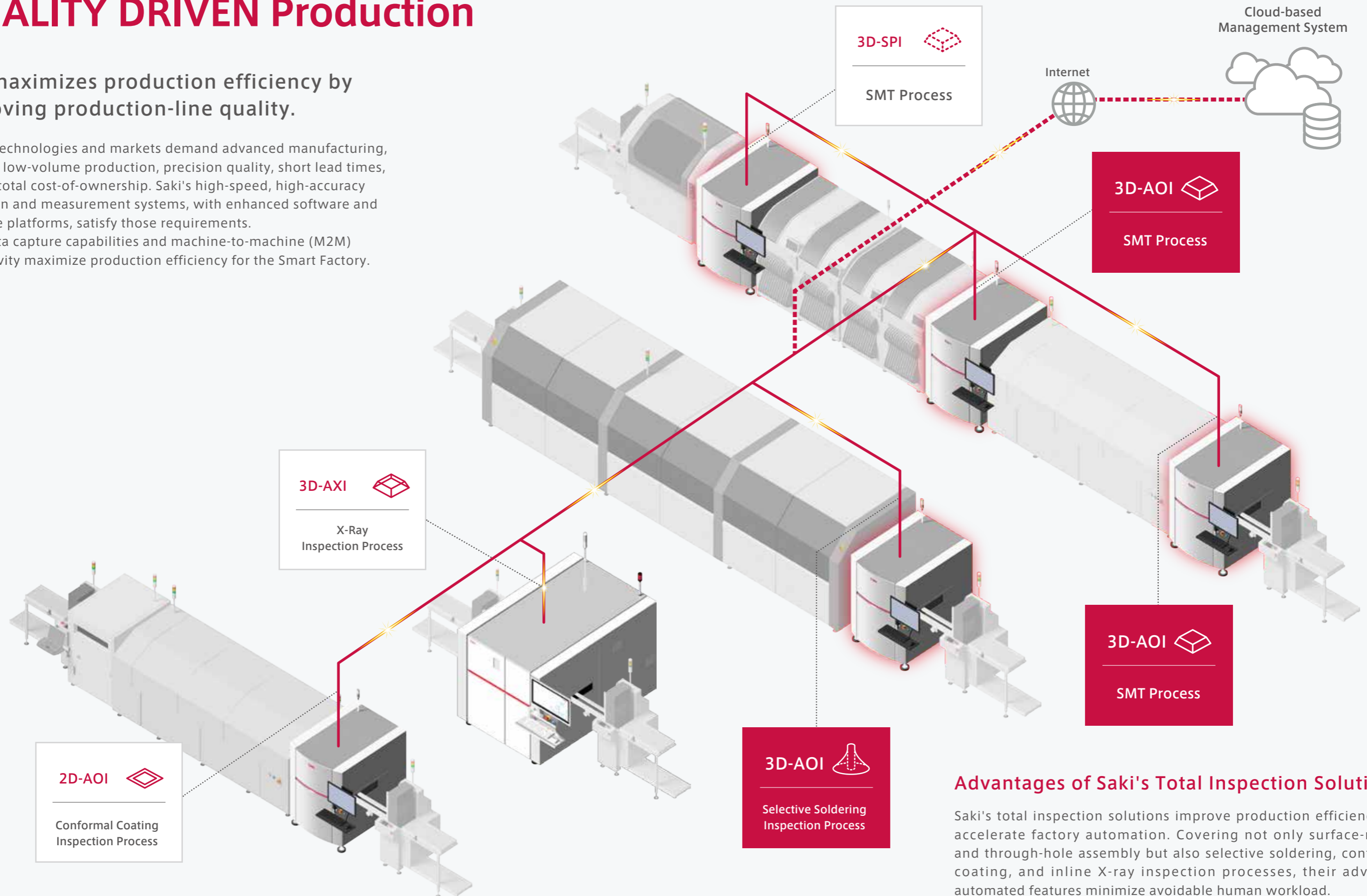
Saki's Total Smart Factory Inspection Solution

QUALITY DRIVEN Production

Saki maximizes production efficiency by improving production-line quality.

Today's technologies and markets demand advanced manufacturing, high-mix low-volume production, precision quality, short lead times, and low total cost-of-ownership. Saki's high-speed, high-accuracy inspection and measurement systems, with enhanced software and hardware platforms, satisfy those requirements.

Saki's data capture capabilities and machine-to-machine (M2M) connectivity maximize production efficiency for the Smart Factory.

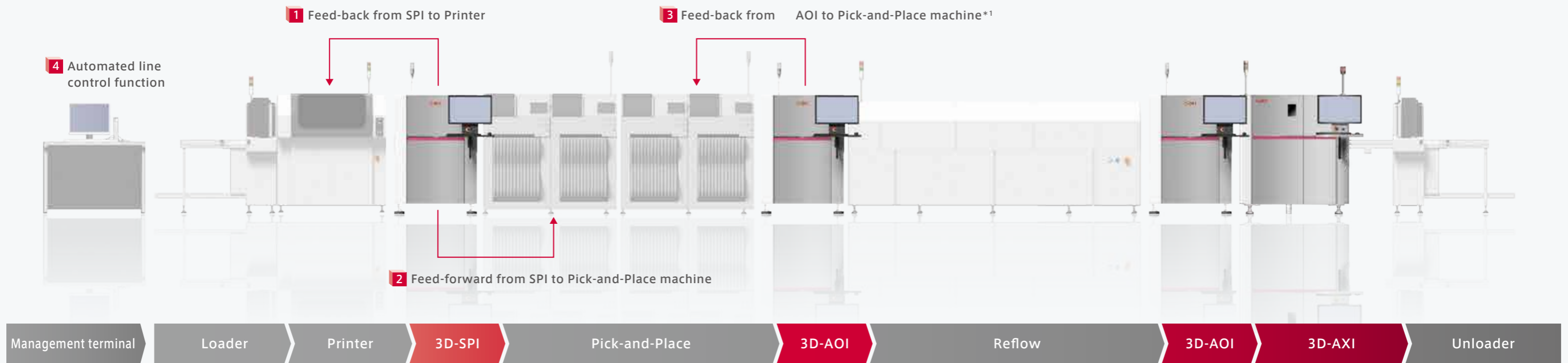


Advantages of Saki's Total Inspection Solutions

Saki's total inspection solutions improve production efficiency and accelerate factory automation. Covering not only surface-mount and through-hole assembly but also selective soldering, conformal coating, and inline X-ray inspection processes, their advanced automated features minimize avoidable human workload.

Solution

Features Provided by Saki's Total Inspection Solutions



Applied Technology

M2M Solution

1 Feed-back from SPI to Screen Printer.

Feeds back misalignment data and prevents print errors by automatically alerting the user when the stencil needs cleaning.



2 Feed-forward from SPI to Pick-and-Place machine

Measures the degree the printing position shifts to correct placement positioning. A NG board skip function improves efficiency, quality, and cost.



3 Feed-back from AOI to Pick-and-Place machine

Feeds back placement position and location data from AOI to pick-and-place and feeds forward data from SPI to improve quality and efficiency.



*1 factory installed option

4 Automated line control function

Automates control of the assembly line to reduce rework and waste and increase throughput.

*1~4 Saki partners with the leading PCB equipment manufacturers. Ask us which products we connect with.

Options

BF2-Editor

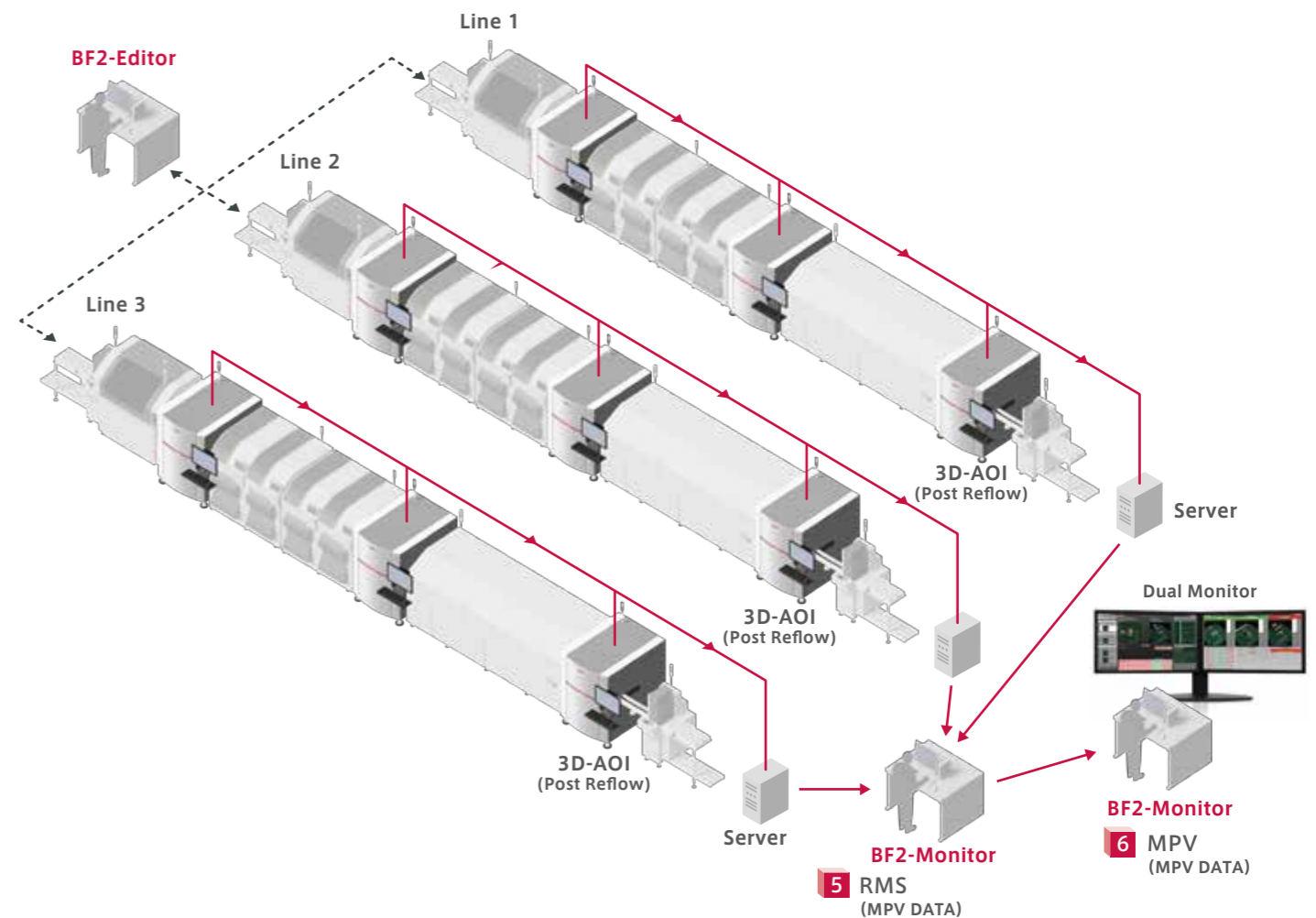
Create data and debug the process offline.

BF2-Monitor (Offline verification terminal)

5 RMS (Remote Management System) Remotely control multiple BF2-Monitors with a single PC. Reduces assembly-floor personnel. Moreover, the production status of each device can be confirmed.

6 MPV (Multi Process View)

The BF2-Monitor shows the results of all inspection processes (SPI, pre-reflow, and post reflow) on one screen in real time for operator review, simplifying the verification process and making it less subject to error. It is also useful for analyzing the cause of a defective board.

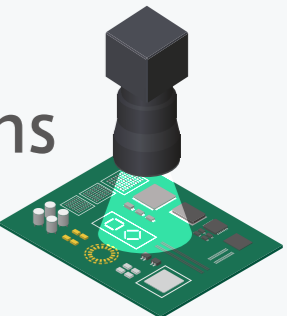
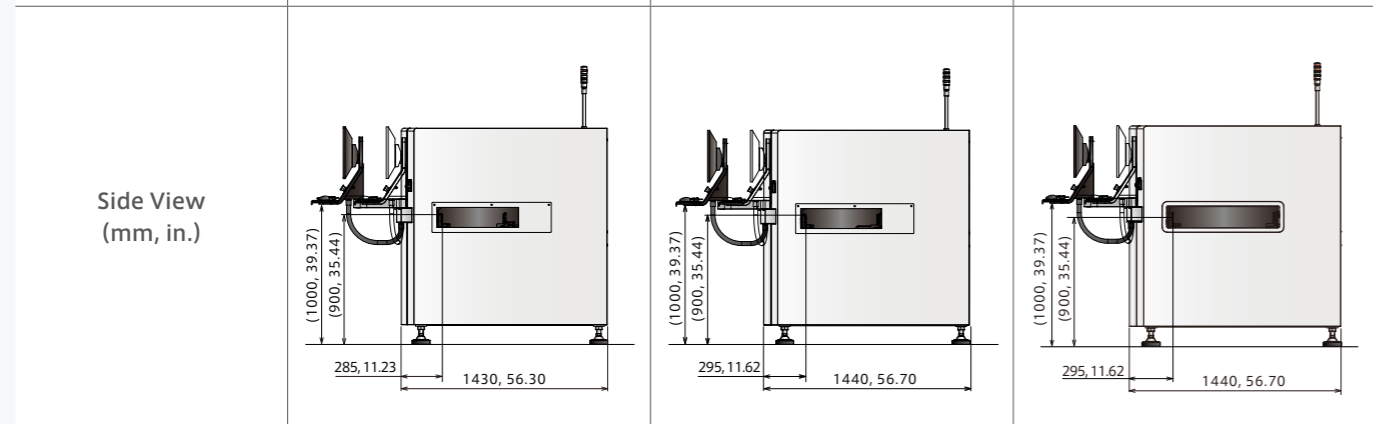
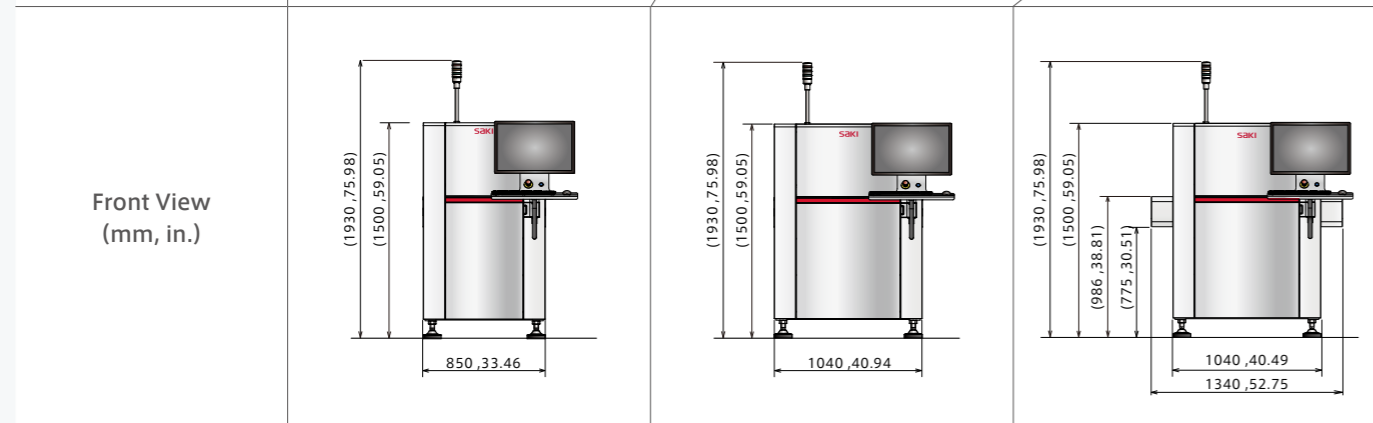


Product

New 3Di Series Product Specifications

Dual-lane system can inspect two different PCBAs simultaneously

Dimensions	M Single lane	M Dual lane	L Single lane	L Dual lane	XL Single lane		
Model Name	3Di-MS3	3Di-MD3	3Di-LS3	3Di-LD3	3Di-ZS3		
Size (W) × (D) × (H) (mm, in.)	850 × 1430 × 1500, 33.46 × 56.30 × 59.06		1040 × 1440 × 1500, 40.94 × 56.69 × 59.06		1340 × 1440 × 1500, 52.75 × 56.69 × 59.06		
Weight	850kg, 1873.93lb		900kg, 1984.16lb				
Electric Power	Single Phase ~ 200-240V+/-10%, 50/60Hz						
Air Requirement	0.5MPa, 5L/min (ANR)						
PCB Size (mm, in.)	—	Single mode	Dual mode	—	Single mode	Dual mode	—
	50×60~330×330, 1.97×2.36~12.99×12.99	50×60~330×330, 1.97×2.36~12.99×12.99	50×60~320×330, 1.97×2.36~12.60×12.99	50×60~500×510, 1.97×2.36~19.68×20.07	50×60~500×510, 1.97×2.36~19.68×20.07	50×60~320×510, 1.97×2.36~12.60×20.07	50×60~686×870
PCB Clearance	Top : 40mm, 1.57in. Bottom : 60mm, 2.36in.	Top : 40mm, 1.57in. Bottom : 50mm, 1.96in.	Top : 40mm, 1.57in. Bottom : 60mm, 2.36in.	Top : 40mm, 1.57in. Bottom : 50mm, 1.96in.	Top : 40mm, 1.57in. Bottom : 60mm, 2.36in.		



3Di Series Optical Unit Specifications

Customize the best combination of resolution and speed

Resolution	8 μm	15 μm COMING SOON
Height Measurement Range	25mm ~ 40mm (with Z-axis option)	
Image Capture Time	4,500mm ² /s	7,000mm ² /s

Optical Options

Lighting Choice for Your Needs	Increased Height Measurement and Inspection Process	Inspection Without Blind Spot
<p>Image reference</p>	<p>40mm</p> <p>0mm</p>	
<p>Ring lighting</p> <p>Compact designed three-stage lighting. Well balanced for general inspection to cover wider range of inspection criteria.</p> <p>Dome lighting NEW</p> <p>Enhances color profile of non-flat area. Suitable for products with high quality quality-assurance expectations such as automotive products.</p>	<p>Increase 3D measurement range and 2D focal range up to 40mm. Supports 2D and 3D inspection capabilities for taller component and text recognition. The Z-axis solution extends inspection capability beyond typical SMT assembly to cover THT, press-fit, and inspection of PCBs in jigs.</p> <p>* factory-installed option</p>	<p>The quad side-camera system enhances inspection capabilities for parts such as connectors, RF shields, QFN and J-lead components, and solder-joint and solder-bridge inspection which is difficult to find using an orthogonal camera alone.</p> <p>* factory-installed option</p>

New Value

Future-proofed AOI for ever-changing market requirements

Production processes and PCB design are changing and adopted rapidly. Saki's new 3D AOI series deliver greater flexibility with the possibility to upgrade or customize the camera resolution and lighting according to the production environment and assembly characteristics. The highly stable and durable gantry ensures sustained accuracy and permits upgrading parts to be repeatedly removed and refitted, allowing significant upgrades to be performed on site in a very short time. Customers can enjoy greater flexibility to add and upgrade future development items in both hardware and software to improve their machine's inspection capabilities.

