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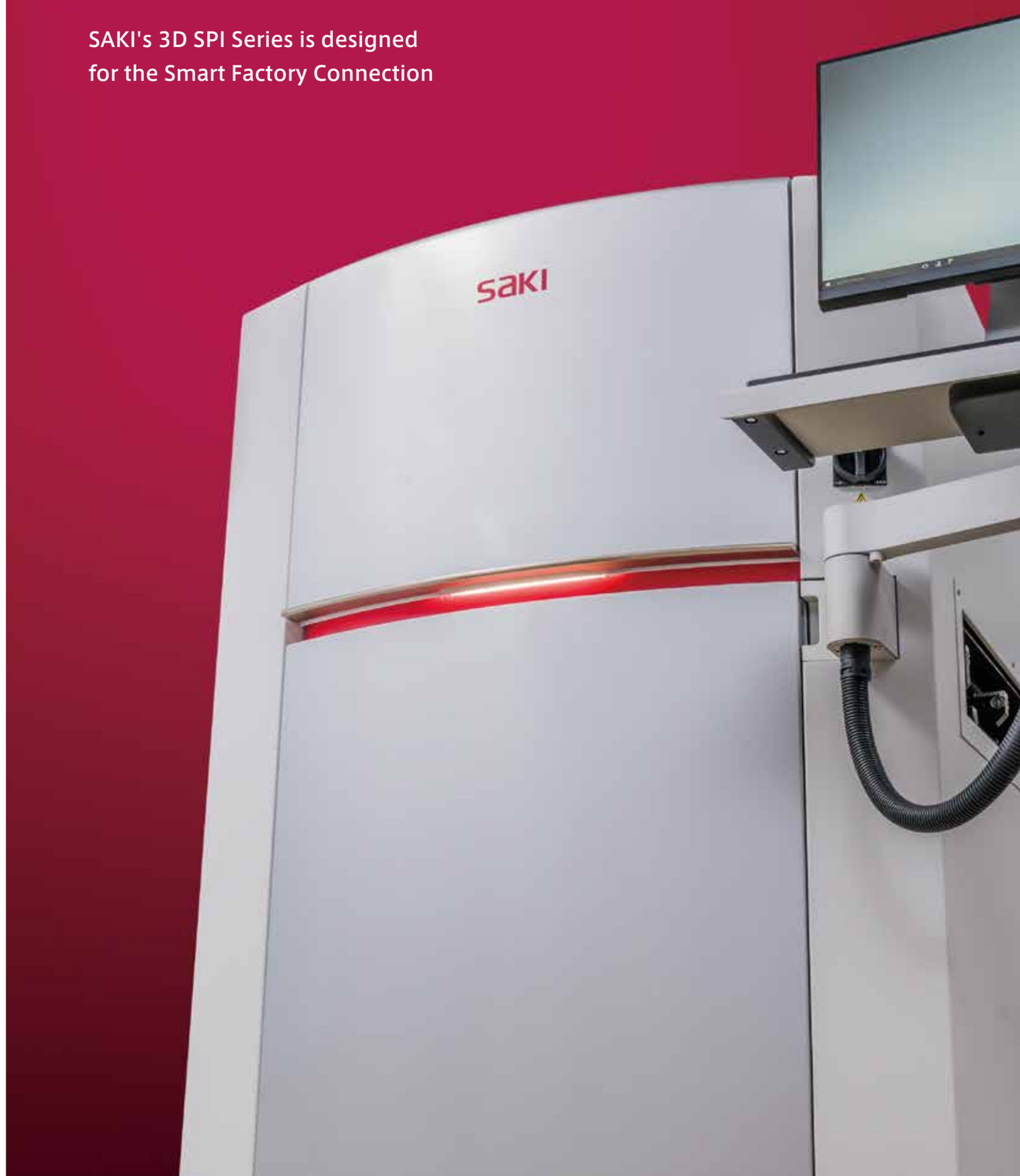
saki
The Future in Focus

3D Solder Paste Inspection Machine (3D SPI)

3Si Series

SAKI's 3D SPI Series is designed
for the Smart Factory Connection

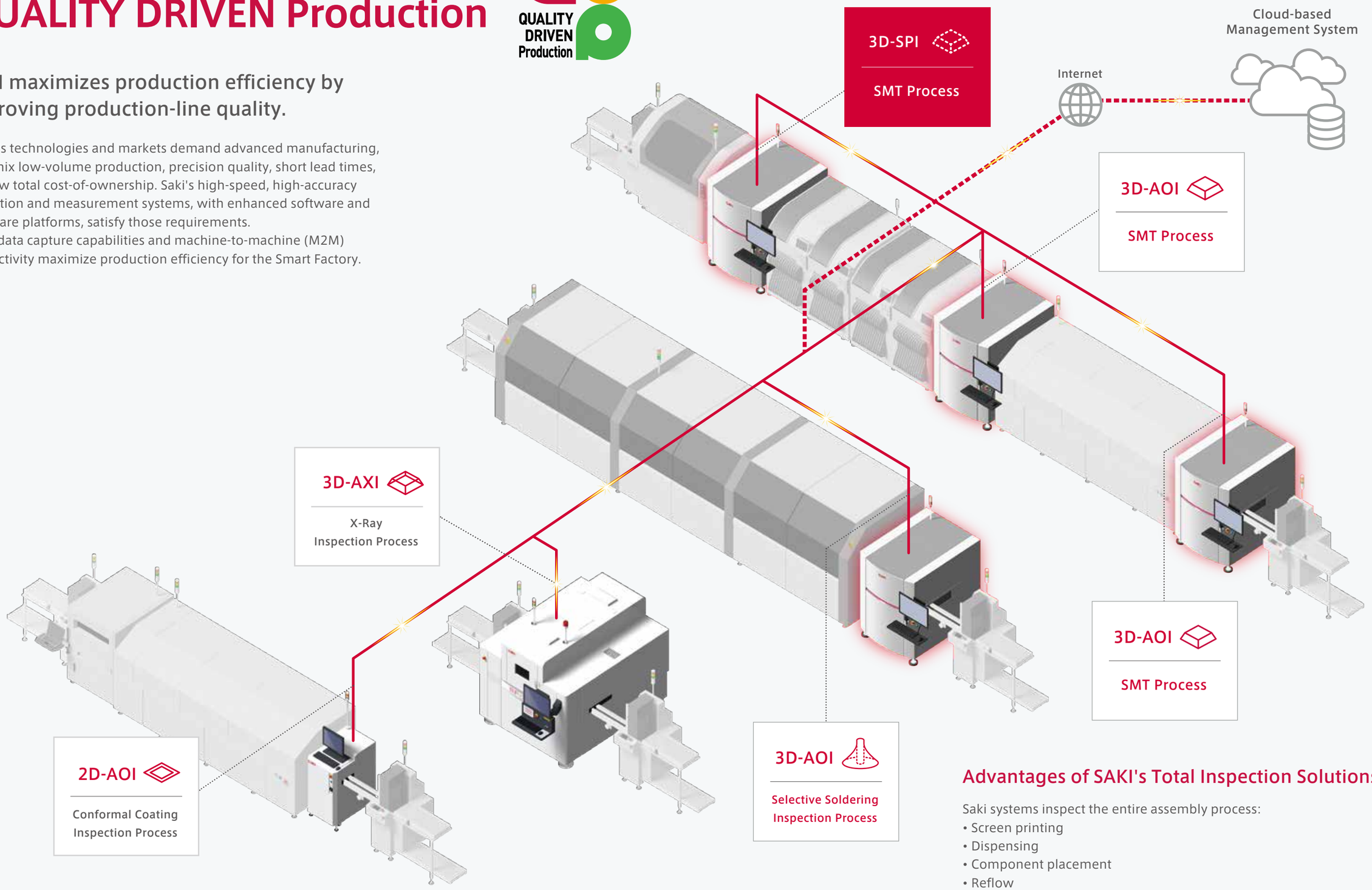


Saki's Total Smart Factory Inspection Solution

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.



※ SPI: Solder Paste Inspection　AOI: Automated Optical Inspection

Advantages of SAKI's Total Inspection Solutions

Saki systems inspect the entire assembly process:
- Screen printing
- Dispensing
- Component placement
- Reflow
- Selective soldering
- Conformal coating

QUALITY DRIVEN Production

Quality First

SAKI's 3D-SPI systems enable increased production efficiency of the entire line with remarkable speed, as well as increased product and performance quality and takt-time control.

Benefits provided with Saki's 3D-SPI series

- Improve production quality
- Improve production efficiency
- Improve profits

Using SAKI's 3D-SPI and 3D-AOI systems together further increases line quality and enhances productivity.

Saki combines proprietary hardware and software to produce stable, highly accurate 3D-SPI and 3D-AOI systems that improve production and maximize process efficiency and product quality.

Key Factor 1 Advanced Hardware Features

Machine Stability and Accuracy

SPI AOI

- Same rigid gantry structure as Saki's 3D-AOI
- Self-diagnostic functions
- Rigid gantry structure and dual motor-drive system
- High resolution linear scale for accurate positioning

Speed

- Increased conveyor speed
- CoaXPress camera for faster inspection & measurement process

Flexible Configurations for Diverse Requirements

- Simultaneous 2D and 3D inspection of the entire board
- Scalable optical resolutions of 7µm, 12µm, and 18µm
- Flexible gantry for M/L/XL PCBA sizes and dual lanes

Key Factor 2 Advanced Software Features

Programming

SPI AOI

- One common platform supports 3D-SPI, 3D-AOI, and 3D-AXI
- Saki Self-Programming (SSP) Software

Speed

- Newly developed high-speed mode increases measurement and inspection speed by about 190%

Measurement and Inspection/SPC Function

- Warpage adjustment
- Coplanarity inspection
- SPC function

Verification

- History Management System for data logging and history
- Golden & Silver Sample Check Function for process verification

Key Factor 3 Applied Technology

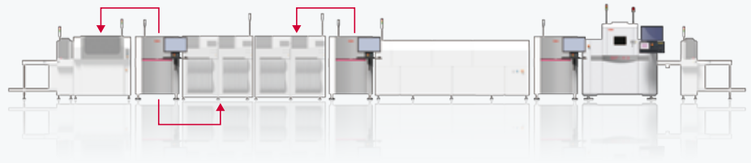
Machine-to-Machine Systems

SPI AOI

- Feed-back from SPI to Printer
- Feed-forward from SPI to Pick-and-Place
- Feed-back from AOI to Pick-and-Place

Stand-alone Systems

- RMS remotely manages multiple BF2-Monitors with one PC
- MPV lets operators see every inspection result in real time



SAKI Technology for M2M Communication

Key Factor 1 Advanced Hardware Features

Proprietary hardware provides faster measurement and inspection and accurate measurements

- Saki's machines are built with hardware that's made to last.
- A closed-loop, dual servo motor-drive system, high-resolution linear scale, and rigid gantry structure provide unsurpassed accuracy and repeatability for absolute measurements.
- An optimized conveyor system, driven by step motors, enables fast PCBA loading and unloading.
- Both the 3D-AOI and 3D-SPI systems have the same rigid gantry structure that offers high accuracy.

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

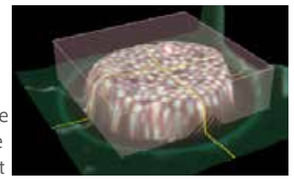
Condition Based Maintenance

Simultaneous 2D and 3D inspections over the entire board

- 3D-SPI uses both 2D and 3D images for inspection.

Optical Unit

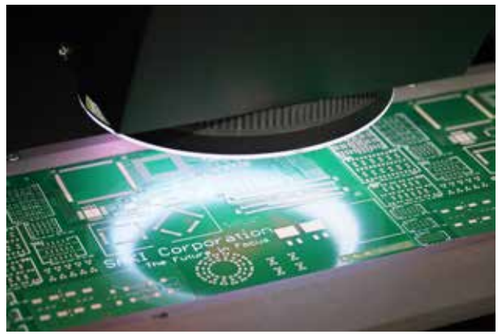
- Three camera resolution levels —7 μ m, 12 μ m, 18 μ m— are available to match application requirements.
- Multi-frequency digital projectors (12um & 18um-Two, 7um-Four) provide accurate 3D measurements for high-quality images and quantitatively detect solder printing failures.
- Enhanced 2D and 3D calibration uses multiple calibration height targets for positive and negative heights to guarantee height measurement accuracy.



Remarkable Speed

Equipped with newly developed technologies and features

- Both 3D-AOI and 3D-SPI have optimized conveyor systems, driven by step motors, in similar enclosures, enabling fast PCBA loading and unloading.
- The CoaXPress camera enables faster inspection.
- A newly developed high-speed mode and unique imaging system increase measurement and inspection speed by about 190% compared to previous machines.



Key Factor 2 Advanced Software Features

Programming

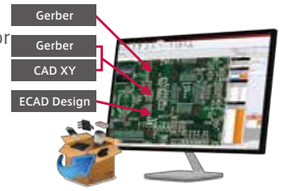
Reduces set-up time,contributing to increased productivity

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

Creating programming data faster

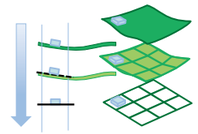
- Saki Self-Programming (SSP) Software

Saki's Self-Programming Function was developed on the concepts of Board less, Skill less, and Stress less. Accurate libraries are automatically created for both SPI and AOI based on the database and BOM data associated with about 300,000 types of components.



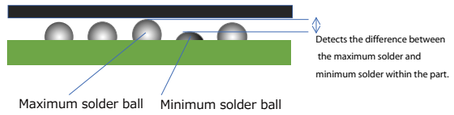
Measurement and Inspection

Saki's unique Warpage Adjustment provides stable inspection for boards with large warpage such as flexible printed circuits.



Coplanarity inspection

In addition to inspecting each solder desposit, we inspect the relative variations in the BGA to increase the quality of small and fine-pitch components.



SPC Function

Trend View

Trend View Monitors inspection results during automatic operation and calculates sample values in real time.
Through this function, the printed solder paste quality can be maintained and controlled for each board.

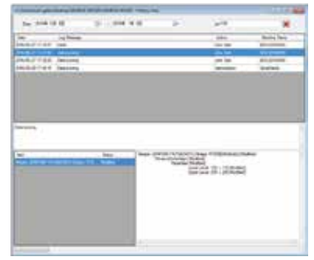
Past Board View

This function saves inspection results and measured values for one week. It enables you to search previously inspected boards from the saved data, sort them by placement data, reference, and component type, and primarily check the inspection results, measured values, failure types, and images of failures.

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)

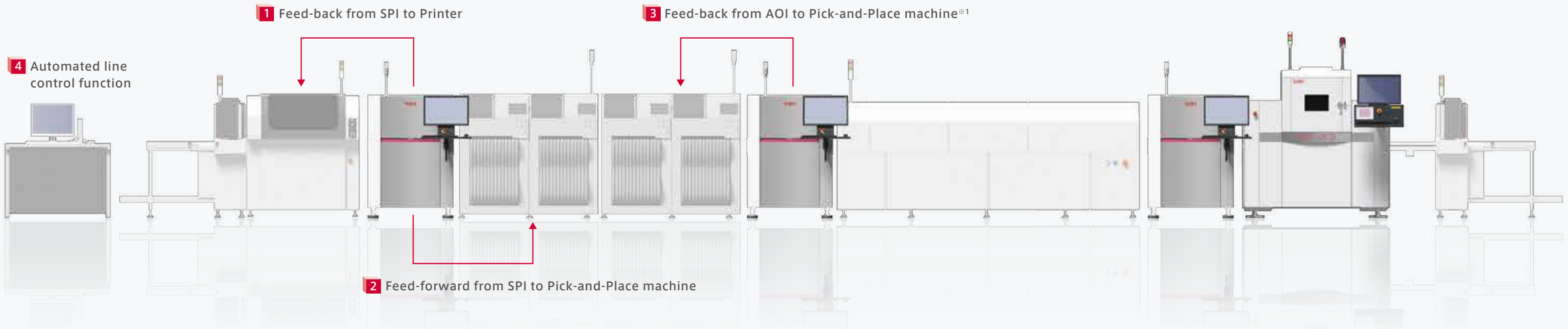


Golden & Silver Sample Check Function

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

Solution

Saki's QUALITY DRIVEN Production Solution



Key Factor 3 **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.

Correction of the print position

Automatic cleaning instructions

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

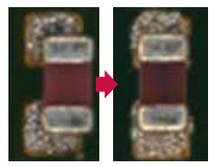
Measures the degree the printing position shifts to correct placement positioning. A NG board skip function improves efficiency, quality, and cost.

NG board skip

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



Placement position correction*1

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

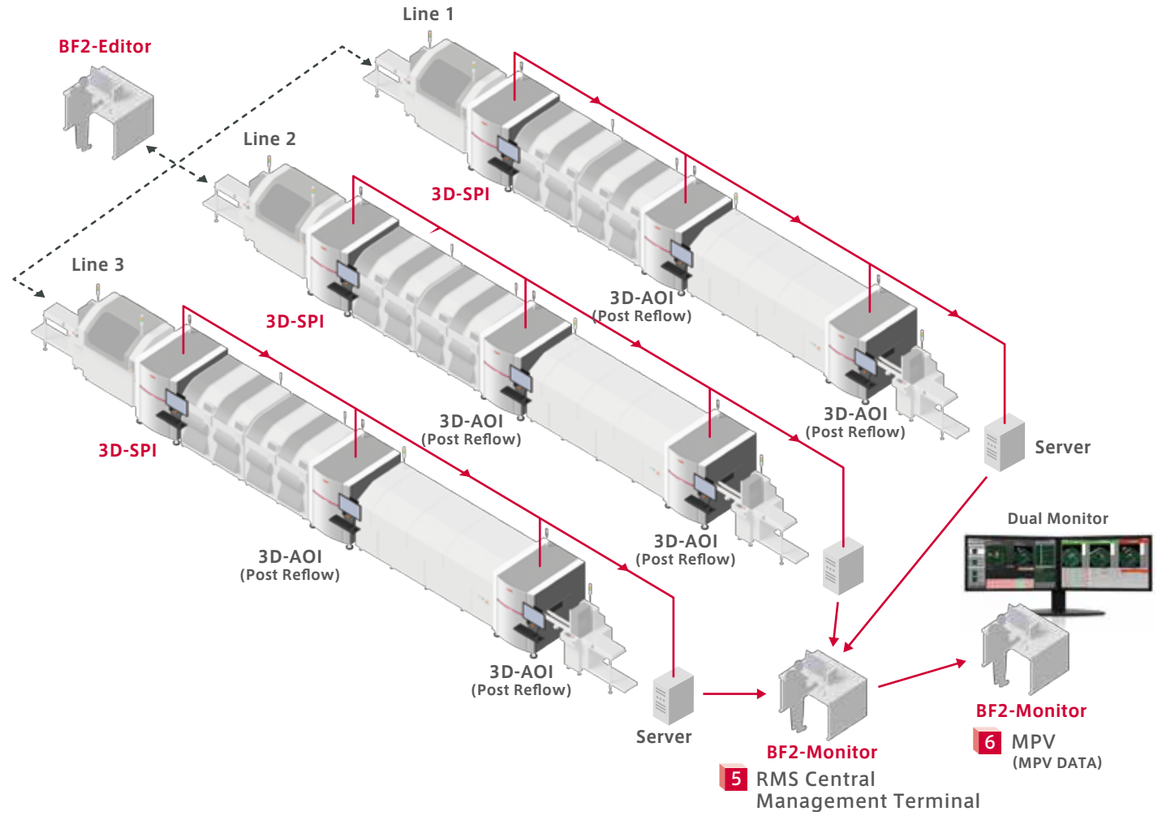
BF2-Monitor (Offline verification terminal)

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)

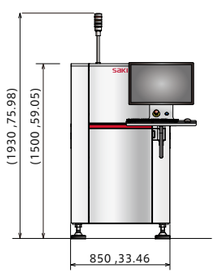
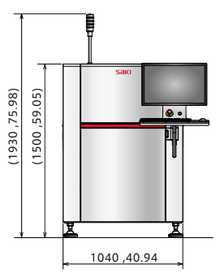
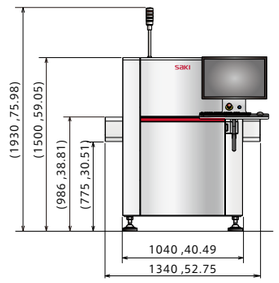
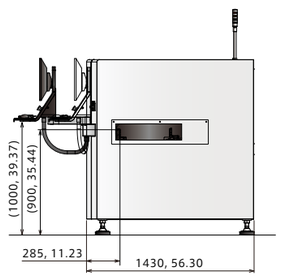
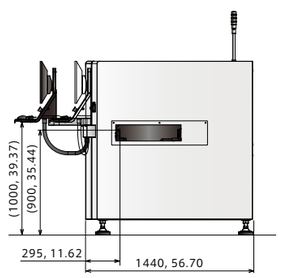
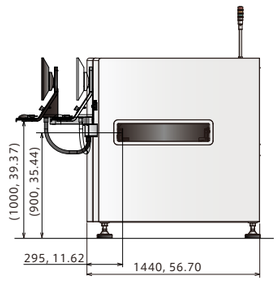
The BF2-Monitor shows the results of all inspection processes (SPI, pre-reflow, and post reflow) on one screen in real time for operator review, simplifying the verification process and making it less subject to error. It is also useful for analyzing the cause of a defective board.



Product

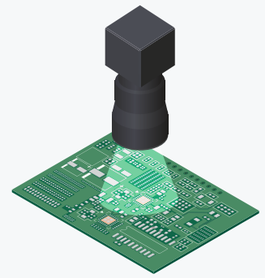
3Si Series Product Specifications

Dual-lane system can inspect 2 different PCBAs simultaneously

Market	Asia		Global		
Dimensions	M Single lane	M Dual lane	L Single lane	L Dual lane	XL Single lane
Model Name	3Si-MS2	3Si-MD2	3Si-LS2	3Si-LD2	3Si-ZS2
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(kg,lb)	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	【7μm camera head】 50×60～330×330, 1.97×2.36～12.99×12.99 【12/18μm camera head】 50×60～500×510, 1.97×2.36～19.68×20.07	【7μm camera head】 50×60～ 330×330, 1.97×2.36～ 12.99×12.99 【12/18μm camera head】 50×60～ 500×510, 1.97×2.36～ 19.68×20.07	【7μm camera head】 50×60～ 320×330, 1.97×2.36～ 12.60×12.99 【12/18μm camera head】 50×60～ 320×510, 1.97×2.36～ 12.60×20.07	50×60～686×870, 1.97×2.36～27.00×34.25
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.
Front View (mm, in.)							
Side View (mm, in.)							

● 3Si-ZS2 supports the optical unit with resolution of 18μm.

3Si Series Optical Unit Specifications



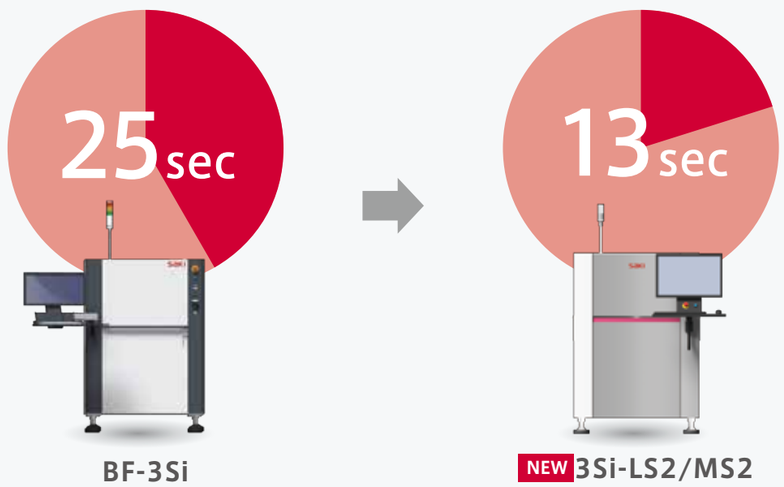
Wide selection of cameras based on various optical resolutions and speeds

Resolution	7μm	12μm	18μm
Height measurement range		500μm	
Image capture time	1,063mm²/s 1,64in.²/s	5,500mm²/s 8,52in.²/s	6,400mm²/s 9,92in.²/s
Major characteristics	Meets requirements for production of advanced smart phones, wearable devices, and devices and modules for IoT. Capable of 0201mm (008004in.) pad inspection.	High-end model with both high-speed and micro part inspection capability.	New optical head increases inspection speed 190% for the highest productivity and throughput speed.

High-definition ⟷ High speed

Substantially improves inspection speed

Comparison between BF-3Si and 3Si-LS2 using an optical unit with 18μm resolution and PCB size 330x250mm(12.99x9.84in.).



BF-3Si

NEW 3Si-LS2/MS2