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- Monterrey, Mexico
- Tijuana, Mexico
- Chihuahua, Mexico
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## **saki** Saki Corporation

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**Global Network**  
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## 3D Automated Optical Inspection (AOI) Systems

# 3Di Series

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



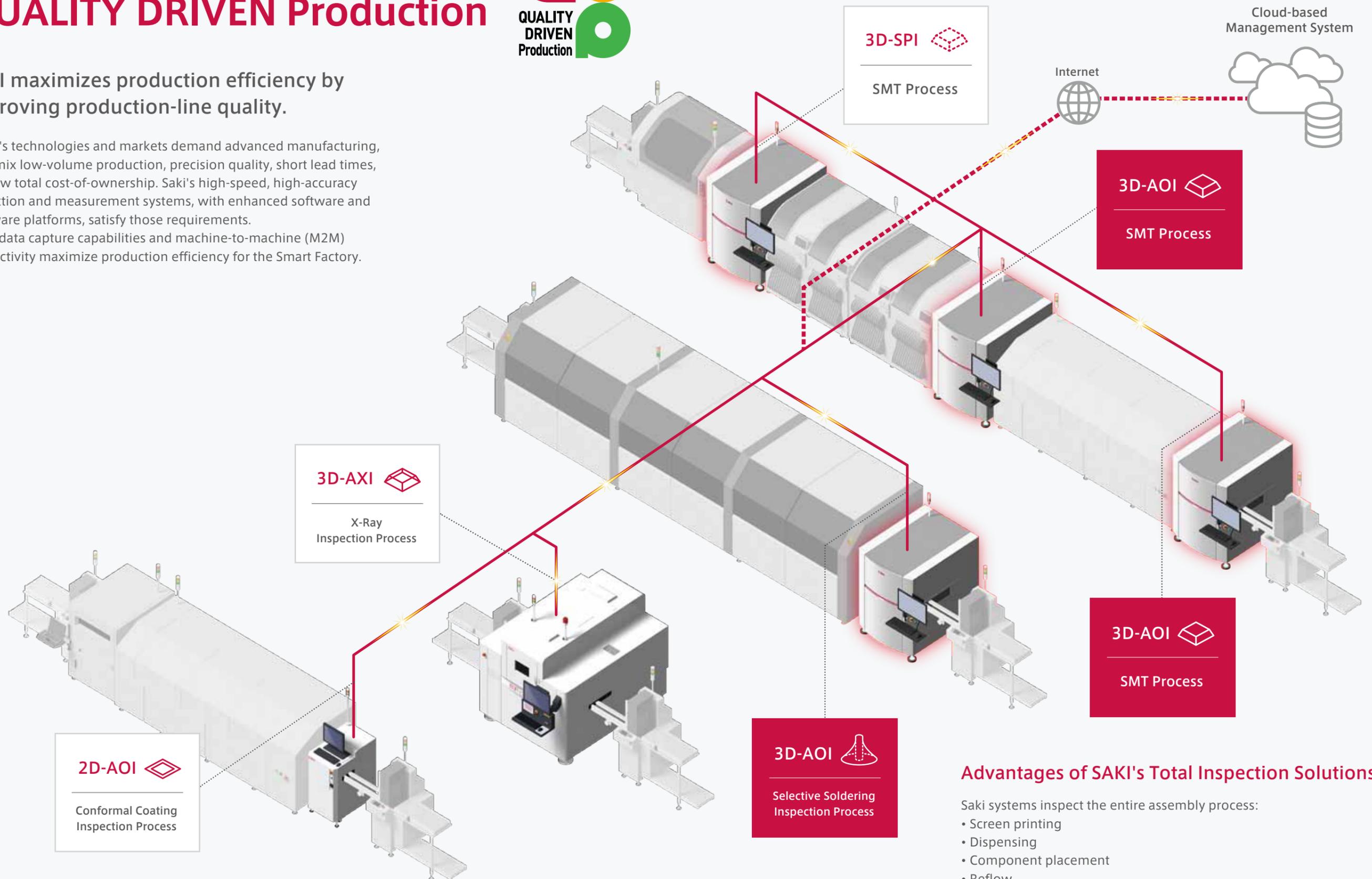
# QUALITY DRIVEN Production



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 systems inspect the entire assembly process:

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

# Quality First



Saki's 3D-AOI systems improve process quality, efficiency, and productivity to improve profits.



## Benefits provided with Saki's 3D-AOI series



Saki combines proprietary hardware and software to produce a stable, highly accurate system that improves production and maximizes process efficiency and product quality.

### Key Factor 1 Advanced Hardware Features

#### Machine Stability and Accuracy

- Self-diagnostic functions
- Rigid gantry structure and dual motor drive system
- High resolution linear scale for accurate positioning
- CoaXPress camera for faster inspection & measurement process



#### Flexible Configurations for Diverse Requirements

- Accurate 3D inspection & measurement for entire PCBA
- Scalable optical resolutions of 7µm, 12 µm, and 18 µm
- Flexible gantry for M/L/XL PCBA sizes and dual lanes



### Key Factor 2 Advanced Software Features

#### Programming

- One common platform supports 3D-SPI, 3D-AOI, and 3D-AXI
- Easy Programming Function
- Compliant with IPC standards



#### Measurement Inspection & Tuning Function

- Offline-debugging with real-time program adjustments
- Height and extra component detection (ECD) functions
- Through-hole device solder inspection

#### Verification

- History Management System for data logging and history
- Golden & Silver Sample Check Function for process verification
- Side cameras capture areas missed by overhead cameras



### Key Factor 3 Applied Technology

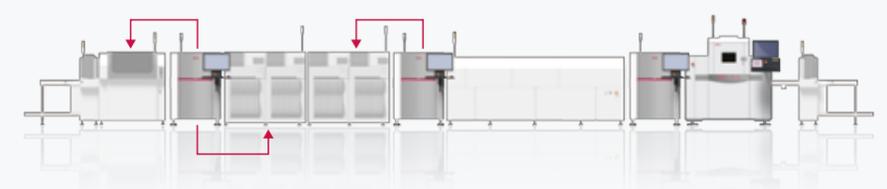
#### Machine-to-Machine Systems

- 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

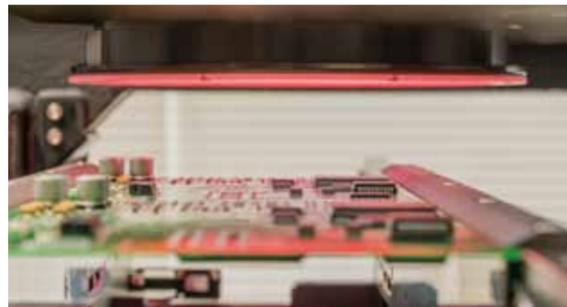
### Advanced Hardware Features

#### Proprietary Hardware provides 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.



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.

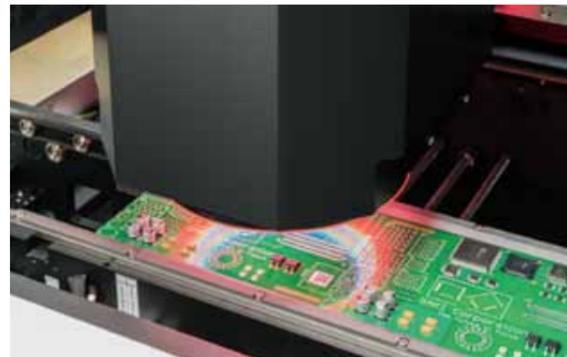


Time Based Maintenance

Condition Based Maintenance

#### Optical Unit

- Four, multi-frequency digital projectors provide accurate 3D measurements for high-quality images.
- Three camera resolution levels—7μm, 12μm, 18μm—are available to match application requirements.
- Saki's CoaXPress interface in the overhead camera captures images 1.7 times faster than previous models.
- Enhanced 2D and 3D calibration uses multiple calibration height targets for positive and negative heights to guarantee height measurement accuracy.

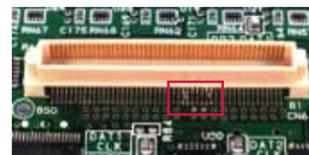


#### Side Cameras\*

A quad side camera system ensures inspection of the entire board, including dead angles and areas missed by overhead cameras.  
\*factory-installed option



TOP Camera Image



SIDE Camera Image

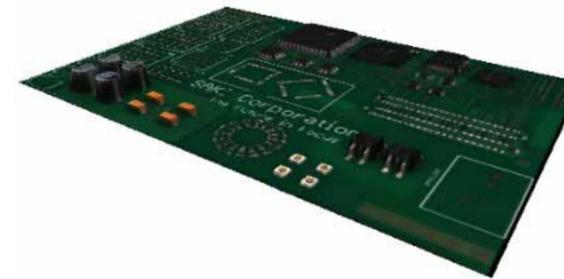


## Key Factor 2

### Advanced Software Features

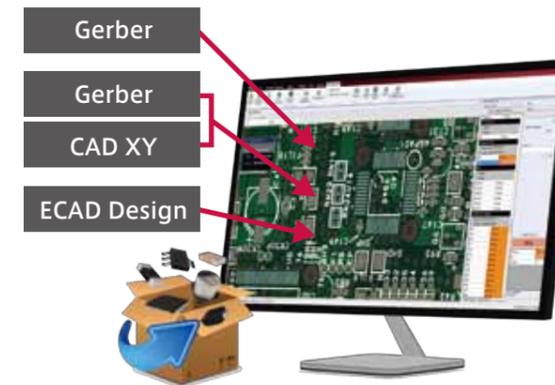
#### Programming

- Special BF2 software has a common user-interface for Saki's 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.



#### Easy Programming

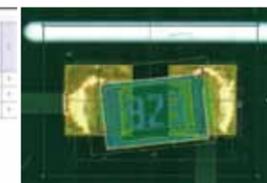
Saki's Easy Programming Function was developed on the concepts of Board less, Skill less, and Stress less. Detailed component libraries can be automatically created using 100K libraries stored in both Saki's database and BOM data.



#### Inspection Data per IPC Standards

Default thresholds of inspection data conform to IPC standards.

Name	Value	OK Range	NG Type
✓ Solder	0.55mm	0.50 - 0.60	
✓ Solder Dip	1.75mm	0.50 - 0.60	
✓ Solder Dip	1.75mm	0.50 - 0.60	
✓ Solder Type	Found	Found	ComponentNG
✓ Solder Depth	21.9%	3 - 25	Overhang
✓ Solder Depth	Sum	3 - 3	Overhang



#### Measurement Inspection and Tuning Function

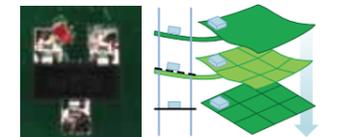
##### Offline Debugging

Operator can edit inspection data to check previous Good/NG images, or real-time defect images, offline without any production interruptions.



##### Warpage Adjustment

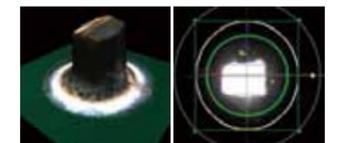
Warpage is compensated automatically. An accurate height map is made of the entire PCBA surface, enabling the Extra Component Detection function to detect foreign material.



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)



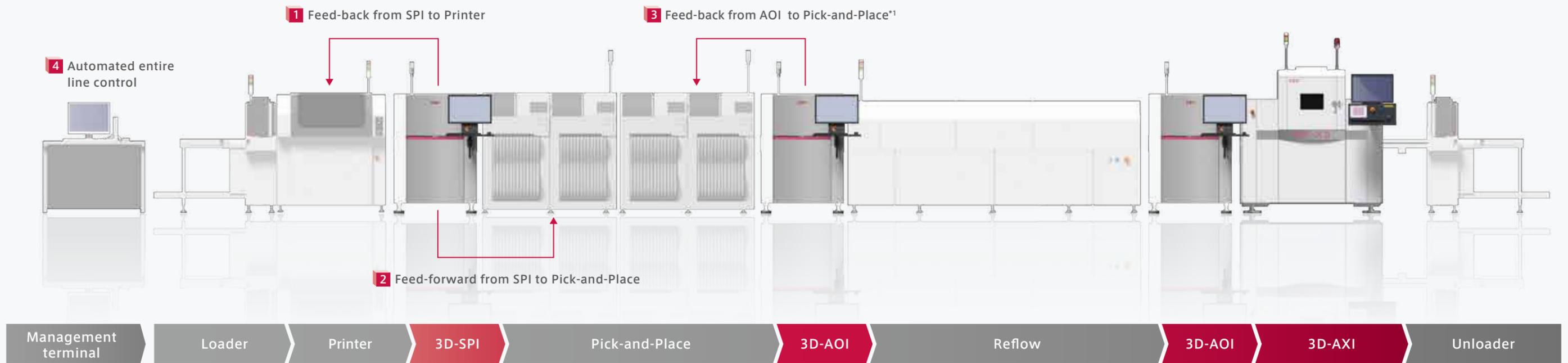
##### Golden & Silver Sample Check Function

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



**Solution**

# Saki's QUALITY DRIVEN Production Solution

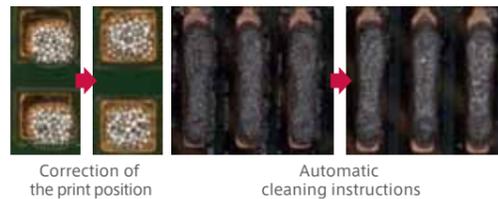


**Key Factor 3 Applied Technology**

## M2M Solution

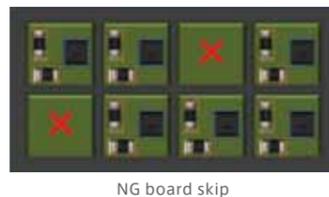
### 1 Feed-back from SPI to Screen Printer.

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



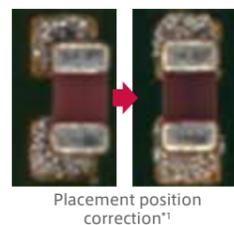
### 2 Feed-forward from SPI to Pick-and-Place machine

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

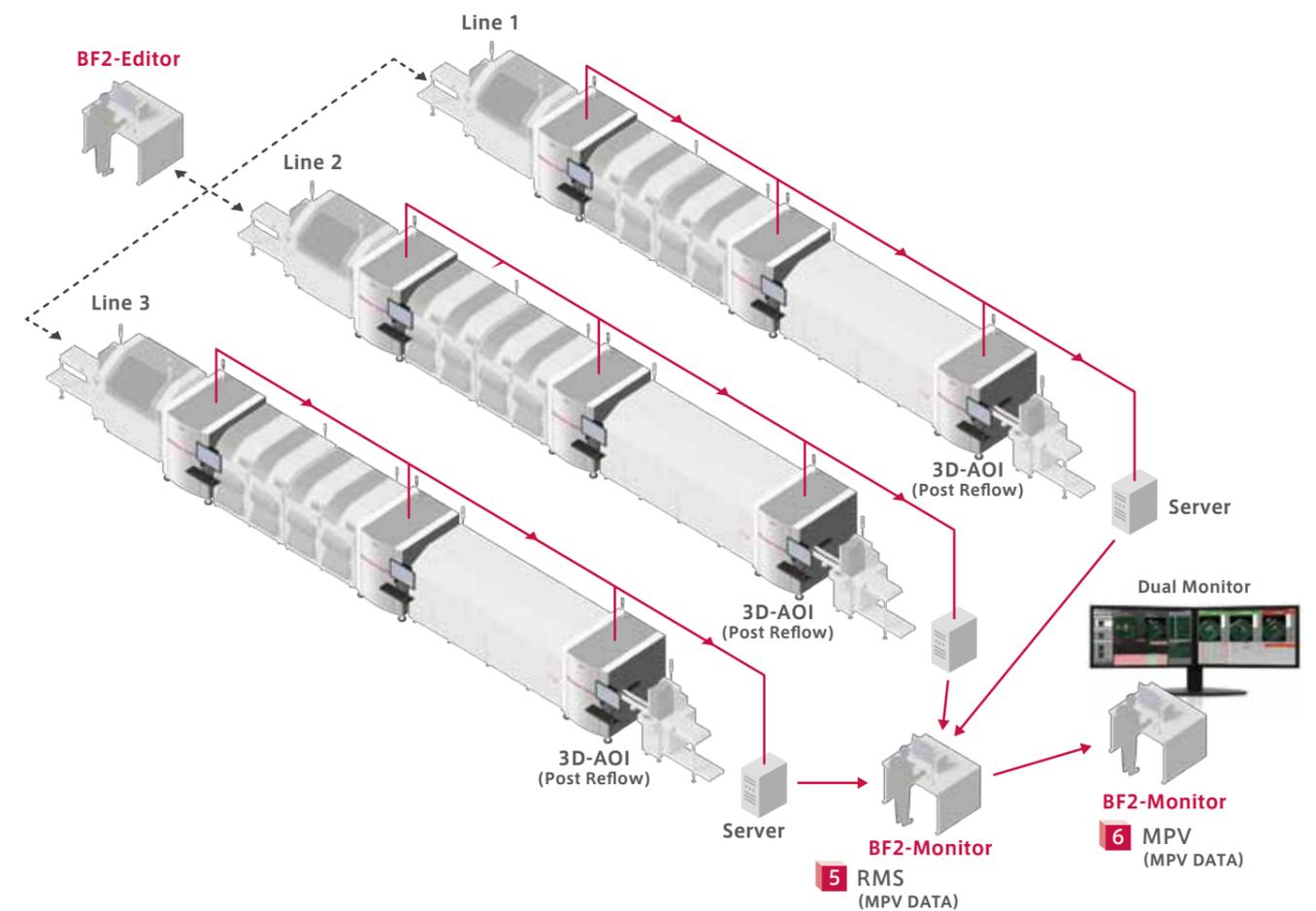
Create data and debug the process offline

#### 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.



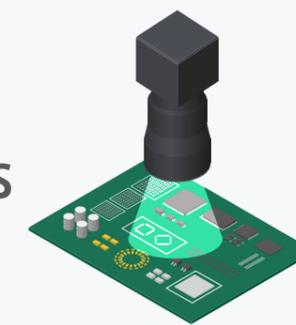
Product

# 3Di 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	<b>3Di-MS2</b>	<b>3Di-MD2</b>	<b>3Di-LS2</b>	<b>3Di-LD2</b>	<b>3Di-ZS2</b>	
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	<b>[7 μm camera head]</b> 50×60~330×330, 1.97×2.36~12.99×12.99  <b>[12/18 μm camera head]</b> 50×60~500×510, 1.97×2.36~19.68×20.07	<b>[7 μm camera head]</b> 50×60~330×330, 1.97×2.36~12.99×12.99 50×60~320×330, 1.97×2.36~12.60×12.99  <b>[12/18 μm camera head]</b> 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, 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.	Top : 40mm, 1.57in. Bottom: 60mm, 2.36in.
Front View (mm, in.)						
	(1930, 75.99) (1500, 59.06) 850, 33.47	(1930, 75.99) (1500, 59.06) 1040, 40.95	(1930, 75.99) (1500, 59.06) 1040, 40.95 1340, 52.76	(1930, 75.99) (1500, 59.06) 986, 38.82 (775, 30.52)	(1930, 75.99) (1500, 59.06) 1040, 40.95 1340, 52.76	
Side View (mm, in.)						
	(1000, 39.37) (900, 35.44) 285, 11.23 1430, 56.30	(1000, 39.37) (900, 35.44) 295, 11.62 1440, 56.70	(1000, 39.37) (900, 35.44) 295, 11.62 1440, 56.70	(1000, 39.37) (900, 35.44) 295, 11.62 1440, 56.70	(1000, 39.37) (900, 35.44) 295, 11.62 1440, 56.70	

# 3Di Series Optical Unit Specifications



Wide selection of cameras based on various optical resolutions and speeds

Resolution	7 μm	12 μm	18 μm
Height measurement range	4mm, 0.15in. 	10mm, 0.39in. 	20mm, 0.78in. 
Image capture time	<b>1,063mm<sup>2</sup>/s</b> <b>1.64in.<sup>2</sup>/s</b>	<b>3,600mm<sup>2</sup>/s</b> <b>5.58in.<sup>2</sup>/s</b>	<b>5,700mm<sup>2</sup>/s</b> <b>8.83in.<sup>2</sup>/s</b>
Major characteristics	Meets requirements for production of advanced smart phones, wearable devices, and devices and modules for IoT. Capable of 0201mm (008004in.) component inspection.	High-end model with both high-speed and micro part inspection capability.	New optical head increases inspection speed 170% for the highest productivity and throughput speed.
	← High definition		High speed →

## Substantially improves inspection speed

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

