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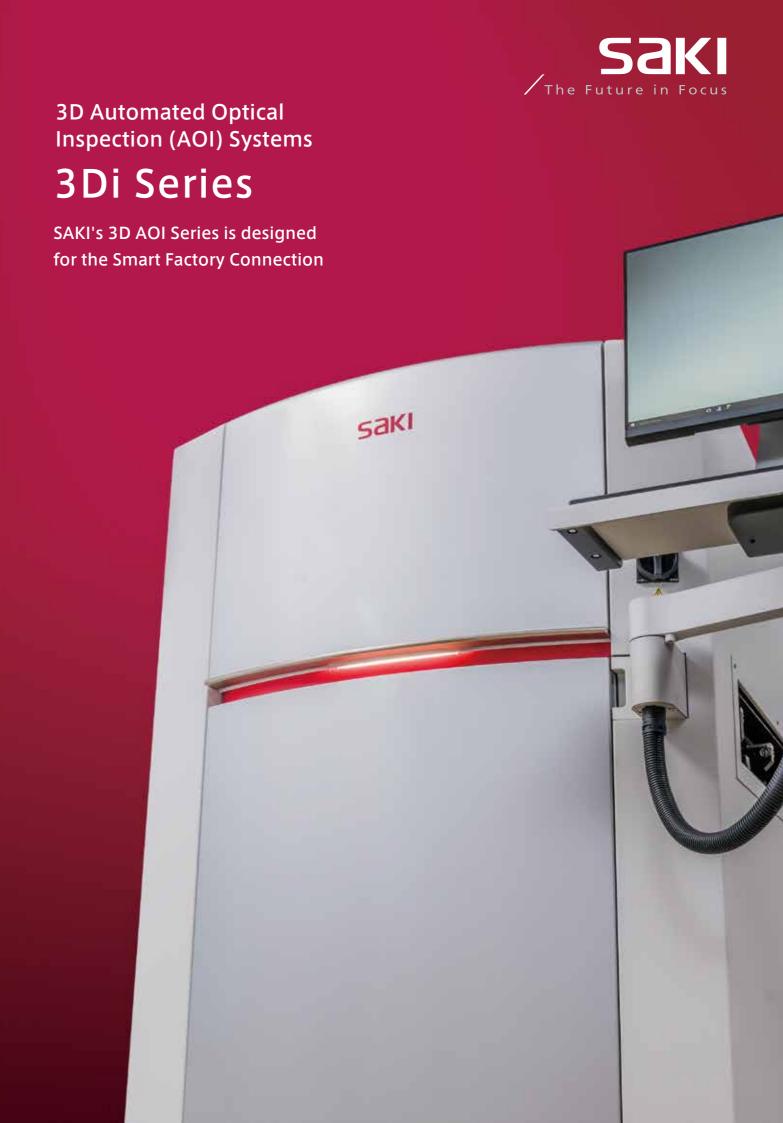
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# Saki's Total Smart Factory Inspection Solution

# **QUALITY DRIVEN Production**

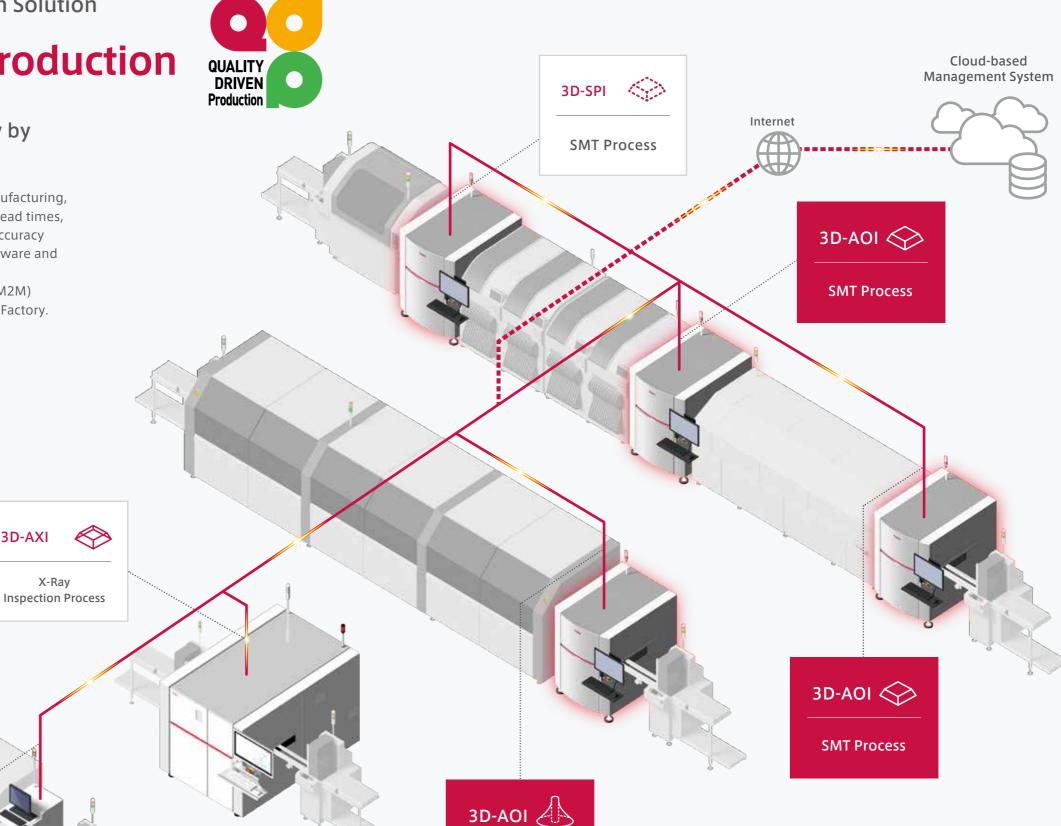
3D-AXI

X-Ray

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.



**Selective Soldering** 

**Inspection Process** 

# **Advantages of SAKI's Total Inspection Solutions**

Saki systems inspect the entire assembly process:

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

**Conformal Coating** 

**Inspection Process** 

2D-AOI

# **QUALITY DRIVEN Production**

# Quality First



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



Saki

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







# **Profits**

**Productivity** 

AOI

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

# Costs

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
- Side Cameras
- Saki' s innovative Z-axis optical-head control feature is now available with 3Di Series inline AOI systems



Key Factor 2

**Advanced Software Features** 

#### Programming

AOI

- One common platform supports 3D-SPI, 3D-AOI, and 3D-AXI
- Saki Self-Programming (SSP) Software
- Compliant with IPC standards
- Job Data Convert Function automatically converts Pick-and-Place machine data to inspection machine data. This function greatly reduces the time required to create inspection data.

#### 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
- Side cameras capture areas missed by overhead cameras



- \* 1 Get in touch to ask about details of the machines on which it is available
- \* 2 Ontional function

### **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



### Applied Technology

# 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
- A closed-loop, dual servo-motor drive system, highresolution 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 Production 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.



### **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 \*factory-installed option

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







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

- Extends maximum height-measurement range up to 40mm;
- Uses standard AOI equipment to inspect special components such as tall press-fit pins;
- Enables accurate defect detection and optical character recognition (OCR) of tall components;
- Provides accurate inspection when the PCB assembly is clamped in a jig, allowing standard AOI to tackle PCB back-end processes.





Key Factor 2

#### **Advanced Software Features**

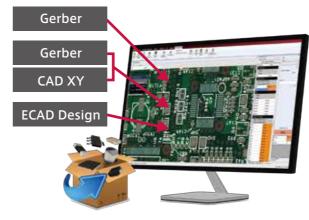
#### **Programming**

- 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.



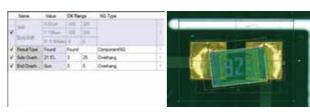
#### Saki Self-Programming (SSP) Software

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



#### Inspection Data per IPC Standards

Default thresholds of inspection data conform to IPC standards.



## Measurement Inspection and **Tuning Function**

#### Offline Debugging

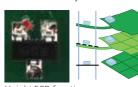
Operator can edit inspection data to check previous Good/NG images, or real-time defect images, offline without any production interruptions.



#### Warpage Adjustment

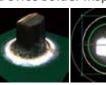
Warpage is compensated automatically. An accurate

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



#### 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.

### **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)

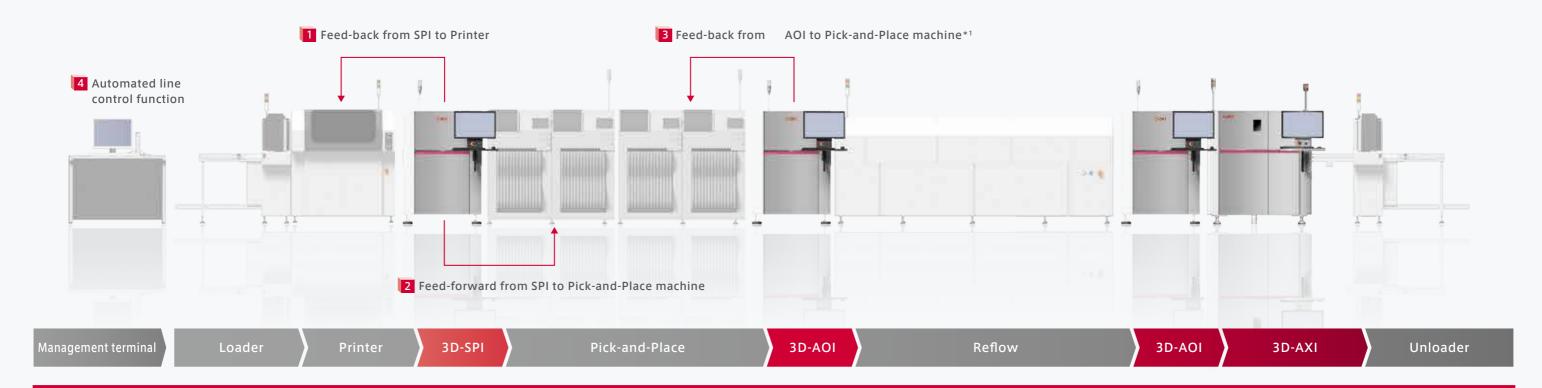


#### Golden & Silver Sample Check Function Maintains inspection accuracy by checking machine status and inspection conditions before starting auto operation.

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#### 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.





the print position







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.



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

\*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

#### Options

#### **BF2-Editor**

Create data and debug the process offline

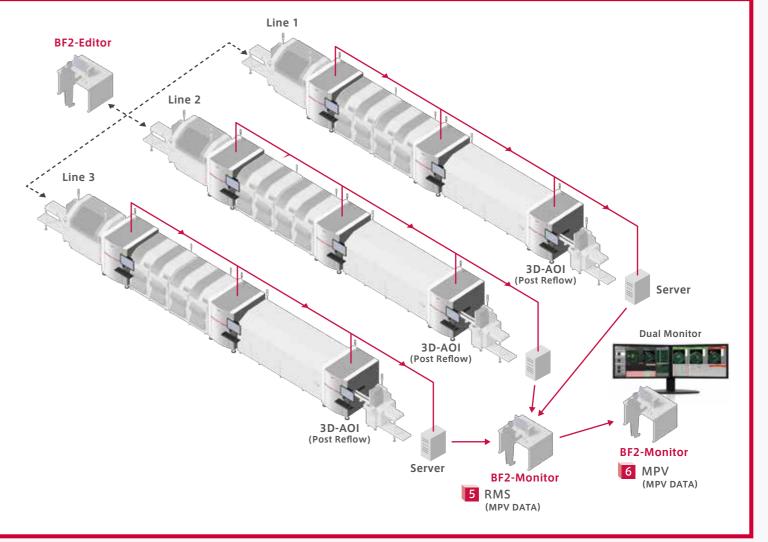
#### **BF2-Monitor** (Offline verification terminal)

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**

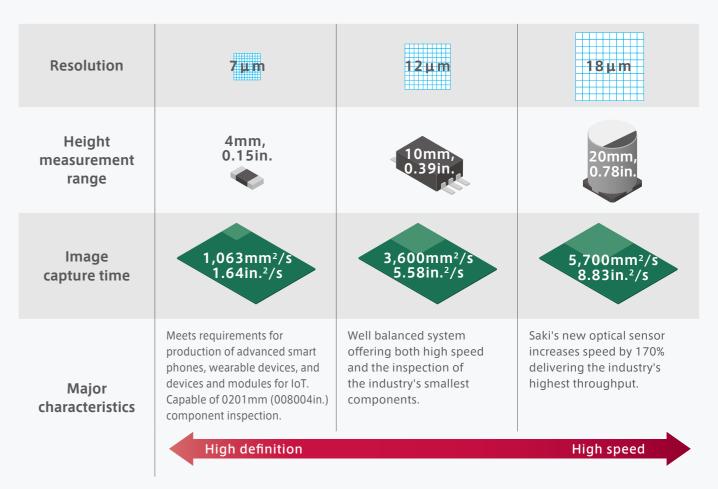
# **3Di Series Product Specifications**

Dual-lane system can inspect 2 different PCBAs simultaneously

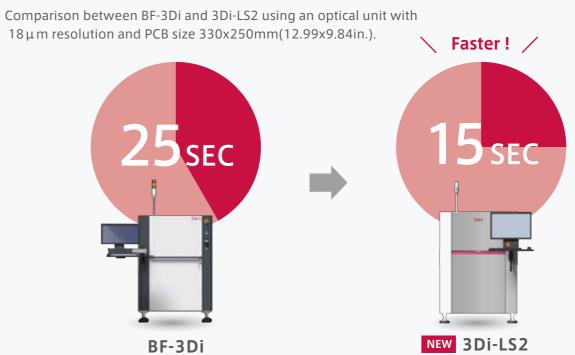
| Dimensions                                   | M<br>Single lane                            |   | <b>/</b> I<br>lane                              | <b>L</b><br>Single lane   | L<br>Dual lane                    | XL<br>Single lane                               |  |
|--|---|---|---|---|-----------------------------------|---|--|
| Model Name                                   | 3Di-MS2                                     | 3Di-  | MD2   | 3Di-LS2   | 3Di-LD2                           | 3Di-ZS2   |  |
| Size (W) $\times$ (D) $\times$ (H) (mm, in.) | 850 × 1430 × 1500,<br>33.46 × 56.30 × 59.06 |   |   | 1040 × 1440 × 1500,<br>40.94 × 56.69 × 59.06  |                                   | 1340×1440×1500,<br>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<br>(mm, in.)                        | -   | Single<br>mode                                  | Dual<br>mode                                    | _   |                                   | ual   |  |
|  | 50×60~330×330,<br>1.97×2.36~<br>12.99×12.99 | 50×60~<br>330×330,<br>1.97×2.36~<br>12.99×12.99 | 50×60~<br>320×330,<br>1.97×2.36~<br>12.60×12.99 | [7 μm camera head]<br>50×60~330×330,<br>1.97×2.36~12.99×12.99   | 330×330, 320>                     | .60~<br>×330,<br>:2.36~                         |  |
|  |   |   |   | [12/18 \( \mu\) m camera head]  50 \times 60 \sim 500 \times 510,  1.97 \times 2.36 \sim 19.68 \times 20.07 |                                   | 1.97×2.36~27.00×34.25<br>660~<br>×510,<br>2.36~ |  |
| PCB Clearance                                | Top: 40mm, 1.57in.<br>Bottom: 60mm, 2.36in. | Top: 40m<br>Bottom: 50                          |   | Top: 40mm, 1.57in.<br>Bottom: 60mm, 2.36in.   | Top: 40mm, 1.5<br>Bottom: 50mm, 1 |   |  |
| Front View<br>(mm, in.)                      | (1930,75,98)                                | 16  | 71030 75 080                                    | (50.65, 0051)   | (1930,7,0591)                     | 1040,40.49<br>1340,52.75                        |  |
| Side View<br>(mm, in.)                       | 285, 11.23<br>285, 11.23<br>1430,           | 56.30   | (1000, 39.37)                                   | 11.62   | (1000, 39.37)                     | 1.62  |  |

# 3Di Series Optical Unit Specifications

Wide selection of cameras based on various optical resolutions and speeds



# Substantially improves inspection speed



with resolution of 18μm.