SİNERJİ
Grup Endüstri Otomasyon
Ticaret ve Sanayi Limited Şirketi

Automated Optical
Inspection System
Dual Lane High Resolution, High Speed

BF-10D

SAKI
The Future in Focus

850 mm
Front view

350 mm   340 mm

1655 mm

1360 mm
Side view

900 mm   1380 mm   2000 mm
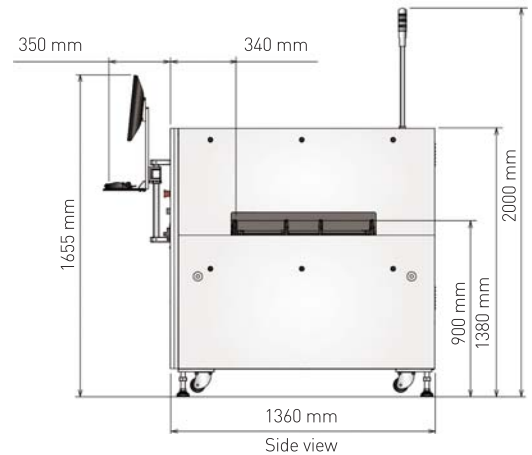
Main Features

BF-10D is a dual lane automated optical inspection system with Saki's original alternate scanning system which provides high throughput. Additionally, programming has been greatly improved, and brings enhanced productivity.

High Throughput

Throughput is now further enhanced by optimized automatic lighting calibration function. Scan time is 30 % faster. Operating system is 64 bit with multicore processing, enable faster throughput and at the same time, compatible with the conventional systems. Tact time is about 16 seconds for two M-size (250 mm x 330 mm) boards and about 12 seconds for two boards of size 150 mm x 330 mm.

Compact, Long-life Design

The system equips the camera-drived line scan system and dual lane conveyor system in a compact design. Highly rigidity frame and low-vibration high-speed camera unit makes it possible to provide longer service life with high repeatability.

Flexible

This dual lane conveyer system is designed to adapt with various placement machines and reflow ovens. It will increase productivity space efficiency and support high speed production.

High Resolution Imaging System

The system is equipped with a newly developed high-speed multi CCD line scanning camera. Through telecentric lens, it is able to inspect densely mounted 01005 (0402) chips. With the further optimization of the LED lighting, a remarkable S/N ratio has been archived through vastly improved color rendering properties.

Programming

Functions useful for inline application have been renewed, including functions such as search pad, search component which helps to enhance the contrast of image affected by application of equivalent parts and oxidation of electrode. By means of the above improvement, changeover time and first pass yield could be improved.

Full color image   Multi-angle color image

Inspection Program provides appropriate images

Specifications

Model	BF-10D
Resolution	10 µm
Board Size	Single lane: 60 x 50 - 460 x 330 mm, Dual lane: 60 x 50 - 330 x 250 mm
Board Thickness	0.6 - 3.2 mm, 24 - 126 mils
Board Warp	+/-2 mm, 80 mils
PCB clearance	Top: 40 mm, Bottom: 40 mm
Rotated component support	Available for 0 - 359° rotation (unit of 1°)
Inspection categories	Presence / absence, misalignment, tombstone, reverse, polarity, bridge, foreign material, absence of solder, insufficient solder, lifted lead, lifted chip, and fillet defect. Each defect name can be changed freely by system function.
Tact time *1 *2 (250 x 330 mm 1 pcb)	Single lane: Approx. 10 sec.
Tact time *1 *2 (250 x 330 mm 2 pcb)	Dual lane: Approx. 16 sec.
Image scanning time *1 (250 x 330 mm)	Approx. 5.5 sec.
Camera (image processing)	Line color CCD camera
Lighting	LED lighting system
Transfer conveyor method	Flat belt transfer
Transfer conveyor height	900+/-20 mm
Transfer conveyor width adjustment	Automatic
Operating system	Windows 7 english version
Optional system	BF-Editor / BF-RP1 / BF-monitor / BF-view
Optional	2D Barcode recognition, journal printer

*1 If PCB size is smaller than 250 x 330 mm, Image scannig time will be shorter than these values. *2 Including image scanning time.

Installation Specifications

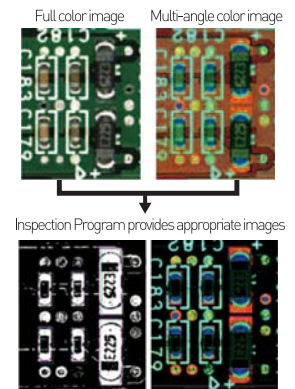|	
Electric power requirement	Single Phase ~100 - 120V / 200 - 240V +/-10%, 50/60Hz
Power consumption	800 VA
Air requirement	0.5 MPa, 5L/min (ANR), 73 PSI, 0.18 CFM
Usage environment	15°C (59F) - 30°C (86F) / 15 - 80% RH (non-condensing)
Dimensions *3 W x D x H	850 x 1360 x 1380 mm
Weight	Approx. 450 kg, 922.3 lbs

*3 Monitor and keyboard arm is not included.
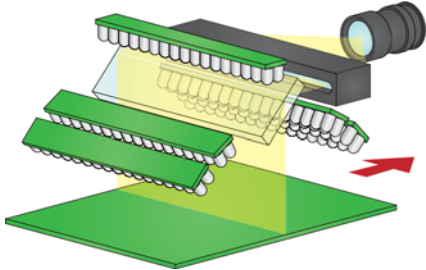
Line Scan Technology

Achieved high-speed inspection independent of the number of components

The line scan technology is a main feature of Saki corporation. Using this technology, a whole PCB can be scanned in high-speed; a PCB of size A4 can be scanned in approximately 10 seconds. For the multi-field of view capturing, its tact time depends on the number of components, and this may cause drastically increase in inspection time. For the line scan technology, because a line sensor camera scans a whole PCB at once, the method does not depend on the number of components. A scanned image will be saved to the memory on the PC (feature "full memory"), and a PCB will be inspected on the memory. All components of any PCBs can be inspected in between 10 to 20 seconds.
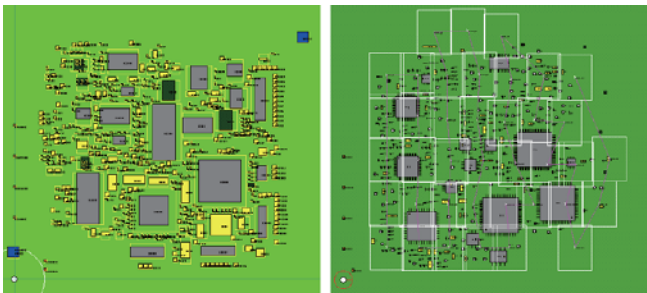
Line scanning   Multi-field of view capturing

Line scan technology

Only the line scan technology enables you to inspect extra parts and save a whole image.
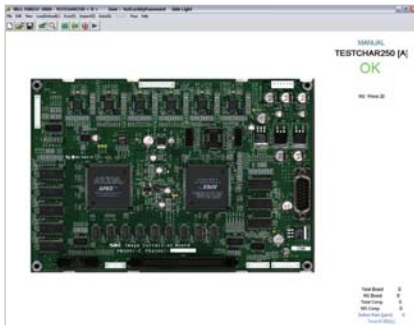

Specifications

Model	PCB Size	Scan Speed
BF-Comet 18	250 x 330 mm	Approx. 7 sec.
BF-Planet-XII	250 x 330 mm	Approx. 9 sec.
BF-Frontier II	460 x 500 mm	Approx. 10 sec.

Telecentric Lens

Achieved assignment of inspection libraries regardless of where components are mounted

The major bottleneck of the line scanning is that it causes blind spots because of lens distortion. Saki adopts a unique optical system; Saki AOI systems have telecentric lens, which can correct optical distortion and enable you to see all components from above. If an image has optical distortion, there is a possibility that a library cannot be applied to same components. Because images captured through the telecentric lens do not have distortion, a same library can be applied to same components, and this can reduce time to create inspection data.

With telecentric lens   Without telecentric lens

CCD

PCB
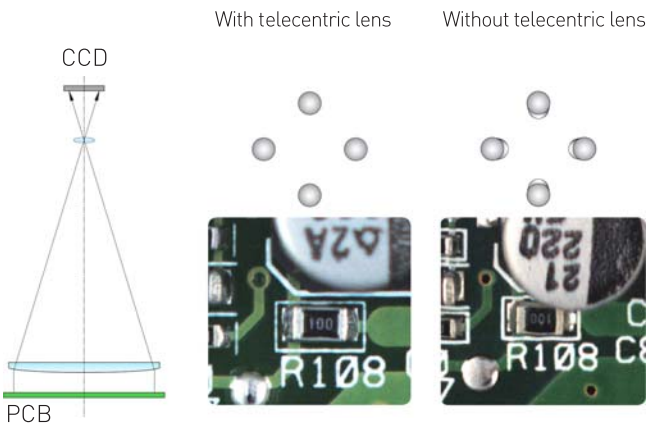
Coaxial TopLight

**Achieved solder inspection by applying Saki original lights from above components**

The coaxial Toplight is a lightning emitted from above components. This lighting is available for solder inspection because there are differences in light reflection between when solder forms fillet and when it does not. The general optical system cannot easily inspect components, such as chips, that are shadowed by large tantalum capacitors or variant components; however, our coaxial toplight enables you to easily inspect components right by large ones.

Telecentric lens

Half mirror

Coaxial toplight   Ring lighting
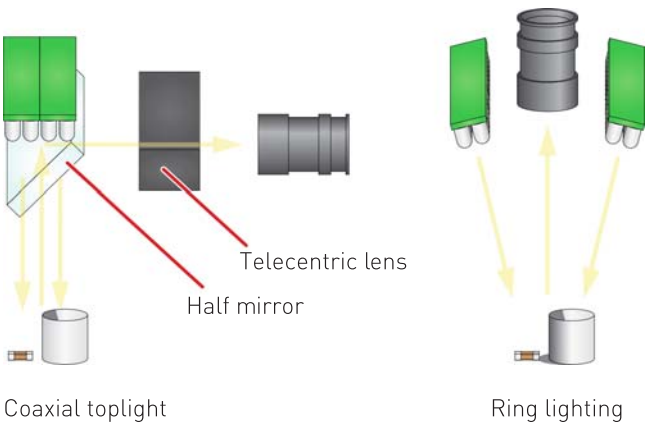
Multi Lighting Technology

Achieved high-accuracy solder inspection and character recognition inspection

The lighting unit that captures an image required for inspections has approximately 3000 LEDs used for lighting. Using Saki's original LED control alternative scanning technology, lighting is blinked several thousand times per second, and then 3 types of images, top, side, and low, are captured at the same time. You can select a lighting with which defects can be easily found.
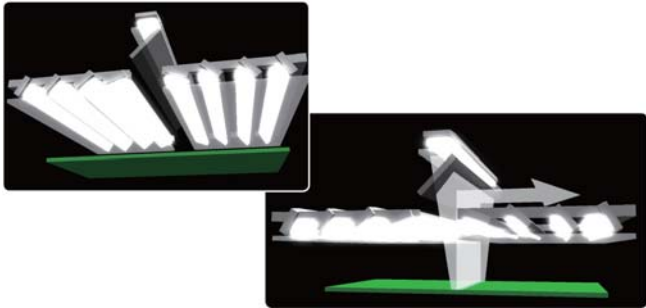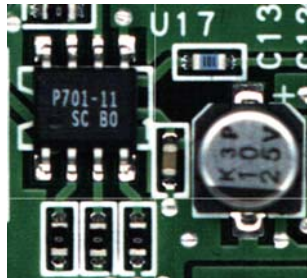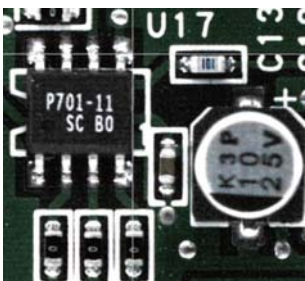
Scan Images

(Toplight)
Available for
solder inspection
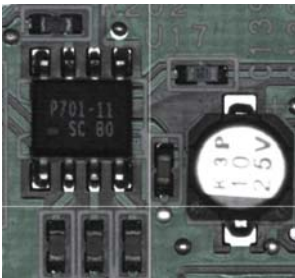
(Sidelight)
Available for inspection using colors
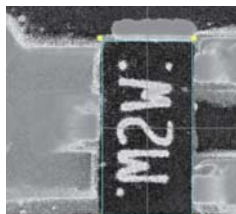(e.g. missing and copper inspections)

(Lowlight)
Available for character
recognition and polarity inspections

(SPECT Lighting)
Available for fillet
and lifted lead inspections
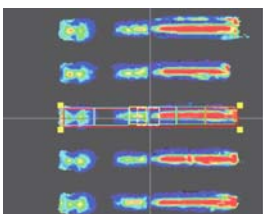
(OK/NG Colors Lighting)
Available for character recognition,
missing and polarity inspections

Inspection Algorithm: Black / White

Inspects solder by calculating a percentage of specified brightness

Black / White is the algorithm to calculate a percentage of an area that specified brightness covers to an inspection window area. You can use this algorithm to inspect whether solder is mounted or not and to inspect components using brightness. For example, if the package of a component is black and its mounting place is white, you can use Black / White to inspect whether the component is missing or not.

(Toplight image)
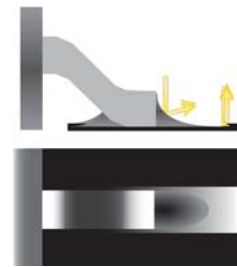
Lights hit on the slope
are not reflected right above.
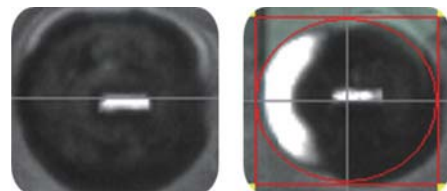
The slope (soldering) looks dark.

Lights hit on the flat are
reflected right above.

If solder is not mounted, the land or pad looks bright.

Perfect for DIP inspection

Can inspect color codes on components and polarities for connectors.

Inspection Algorithm:
OCV (Optical Character Verification)

Inspects characters accurately by matching characters

OCV is the algorithm to inspect characters on components. The algorithm matches registered characters to characters on a component for each one, and calculates a rate of the matching. For the previous multiplier inspections, when multipliers on components are different even if their sizes are the same, operators have to create libraries for each multiplier. Now, the function, Macro skip, enables you to share same libraries between components with different multipliers.

Several different character images can be saved and matched.
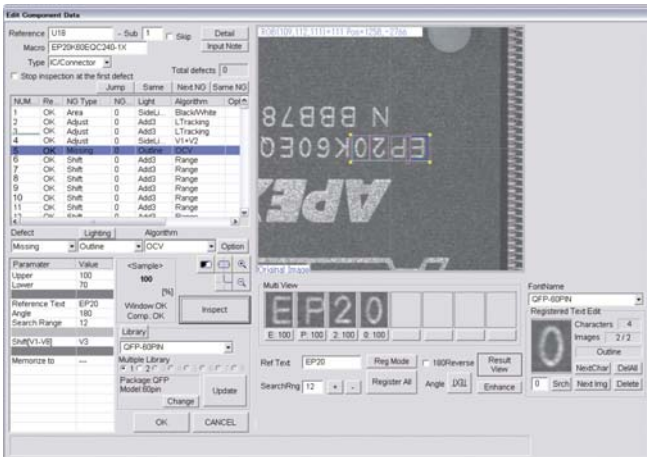
Inspection Solution: THDW indow Creator/
FUJIYAMA only for flow soldering inspections

For inspections of the flow process, operators had to manually create inspection windows one by one because component coordinate data is not used. This inefficiency was a major problem in creating inspection data. Using our technology, we have developed THD window creator with which inspection windows can be automatically created, and also developed an algorithm, FUJIYAMA, which can be used only for flow soldering inspection. These developments can speed up data creation and improve inspection ability.

• THD window creator

Automatically creates inspection windows

THD window creator detects differences in images between bear PCBs and PCBs with components mounted, and then automatically creates inspection windows at the detected positions. This can greatly reduce your loads on creating inspection data. After the automatic window creation, you can use edit tools with a high degree of freedom, such as library assignment and grouping of several inspection windows.
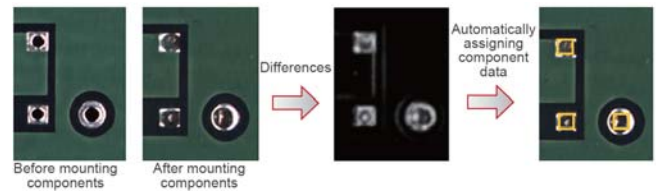
• FUJIYAMA

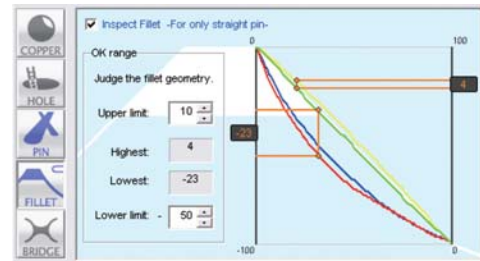### Can inspect 5 items with one inspection window at the same time

Solder can be inspected from 4 directions, and the solder form can be displayed with a graph according to brightness.

We have achieved the improvements in inspection accuracy and visibility and reduction of time in creating inspection data.

THD window creator

FUJIYAMA

Inspection Solution:
ECD2 (Extra Component Detection)

Detects unintended defects on a PCB compared to good-quality PCBs

ECD2 can inspect a whole PCB, and detect solder balls, foreign particles, and components that are fallen in unexpected areas on a PCB. It loads the images of approximately 10 good-quality PCBs as samples, and compares a PCB to inspect with a PCB image created from the samples. Then, ECD2 shows differences between the PCBs as NG on the screen. Data creation for ECD2 does not depend on individual skills because ECD2 creates inspection data from loaded samples. We have enhanced its detection accuracy by improving internal processing, and simplified the procedure for creating data by adopting wizards.

* Depending on PCB conditions or sizes of foreign particles to detected, ECD2 cannot detect differences. For more details, contact our sales representatives.

Perfect for detecting fallen chips and foreign particles
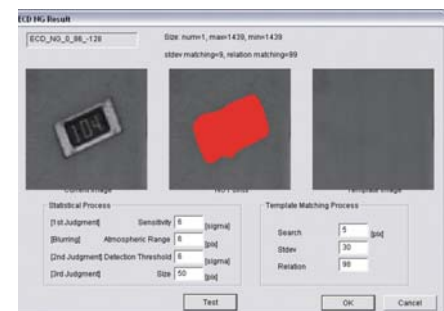
Performs missing inspection with simple and easy settings

KPK enables you to perform missing inspection with simple settings. We recommend using KPK if you have no time to create data for test production, or you want to use only missing inspection before reflow or at the last processing, or to perform missing inspection only for some initial lots of mass production. After you create inspection data following a wizard, missing inspection data will be automatically created. You can see unmounted and mounted areas with the inspection data.
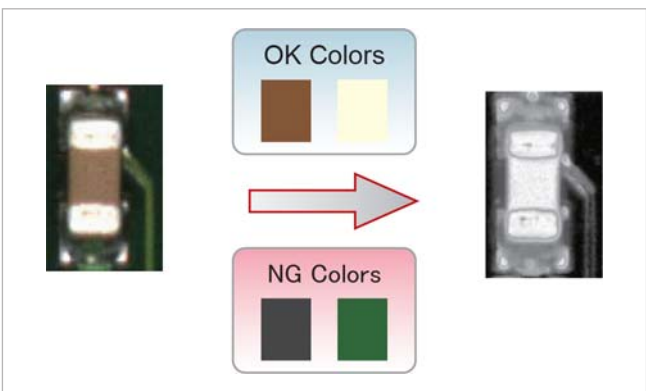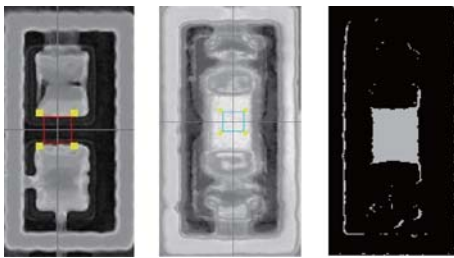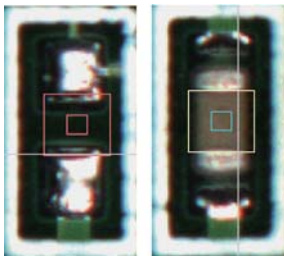
OK Colors

NG Colors

**Available for launch of unexpected production**

KPK uses the OKNG colors lighting. OKNG colors is a virtual light, which shows that a specified area is close to either OK-color or NG-color groups. Using the light, KPK automatically registers a color when a component is not mounted as an NG one and a color when a component is mounted as an OK one, and inspects PCBs.

**BF-Editor**

Off-line teacher

BF-Editor can communicate with the entire series of Saki AOI systems, and enables you to create data offline. With "full memory", you can save a whole image of a PCB and create data offline using the saved image.
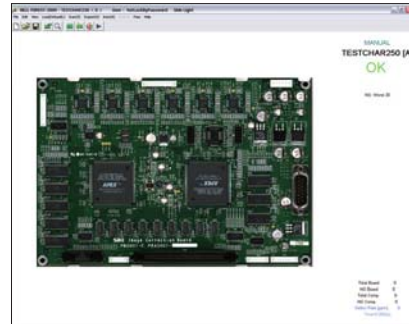
BF-RP1

Repair terminal

BF-RP1 can communicate with the entire series of Saki AOI systems, and enables you to check defects. BF-RP1 shows location information, defect information and images, and prevents operators from overlooking defects.
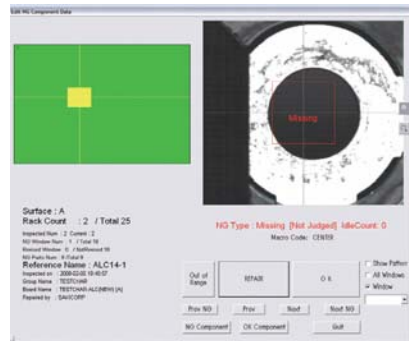
BF-Monitor

AOI simultaneous management system

BF-Monitor enables you to visually check detected defective areas in real-time. BF-Monitor collects detected defects from AOI systems operating in-line in real-time, therefore, you can evaluate quality remotely.
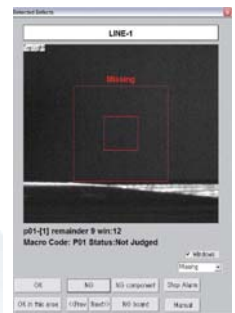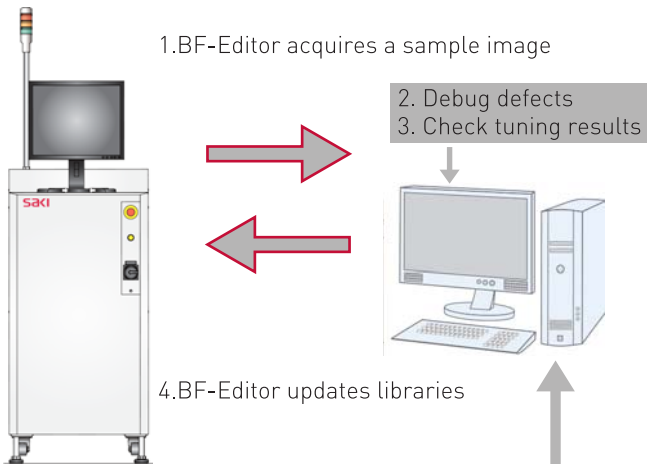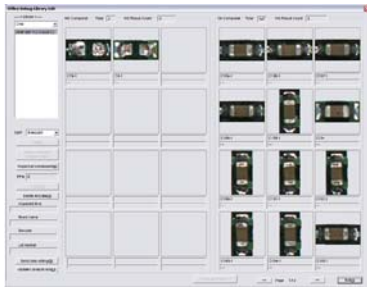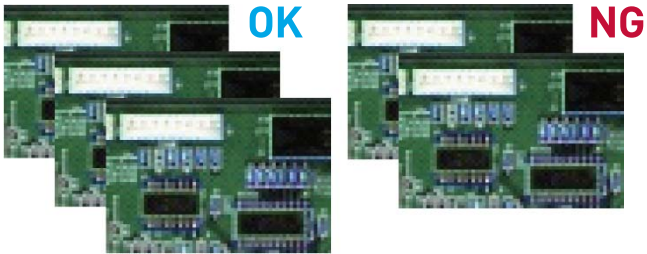
[BF-View]
Real-time Process Managing System,

TO BE RENEWAL

Using BF-View, you can analyze defect information of several AOI systems (max 100 machines). BF-View creates data of defects and false calls and saves it for 5 years. You can search the data on BF-View.
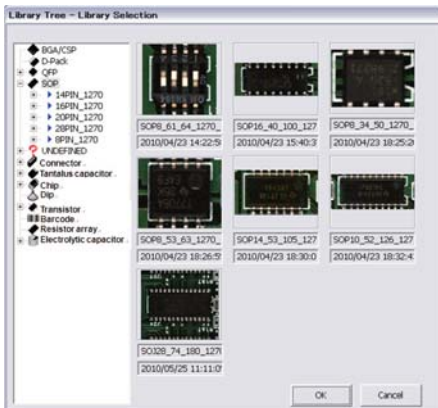
BF-Editor Off-Line Teacher

Enables tuning of libraries using past sample images

OK   NG

1.BF-Editor acquires a sample image

2. Debug defects
3. Check tuning results

4.BF-Editor updates libraries

Library Tree
Enables you to manage data associating component names and library names with images, and to store libraries by package.

BF-Editor can raise operation rates of AOI systems.

BF-RP1 Repair Terminal

**Shows defect information and images and prevents operators from overlooking defects**

BF-RP1 is a system that supports sure repair of defective components detected by AOI systems of the BF series. To surely match detected defects to an actual PCB, there are some managing ways:

1. Barcode
2. Management of the number of rack stages
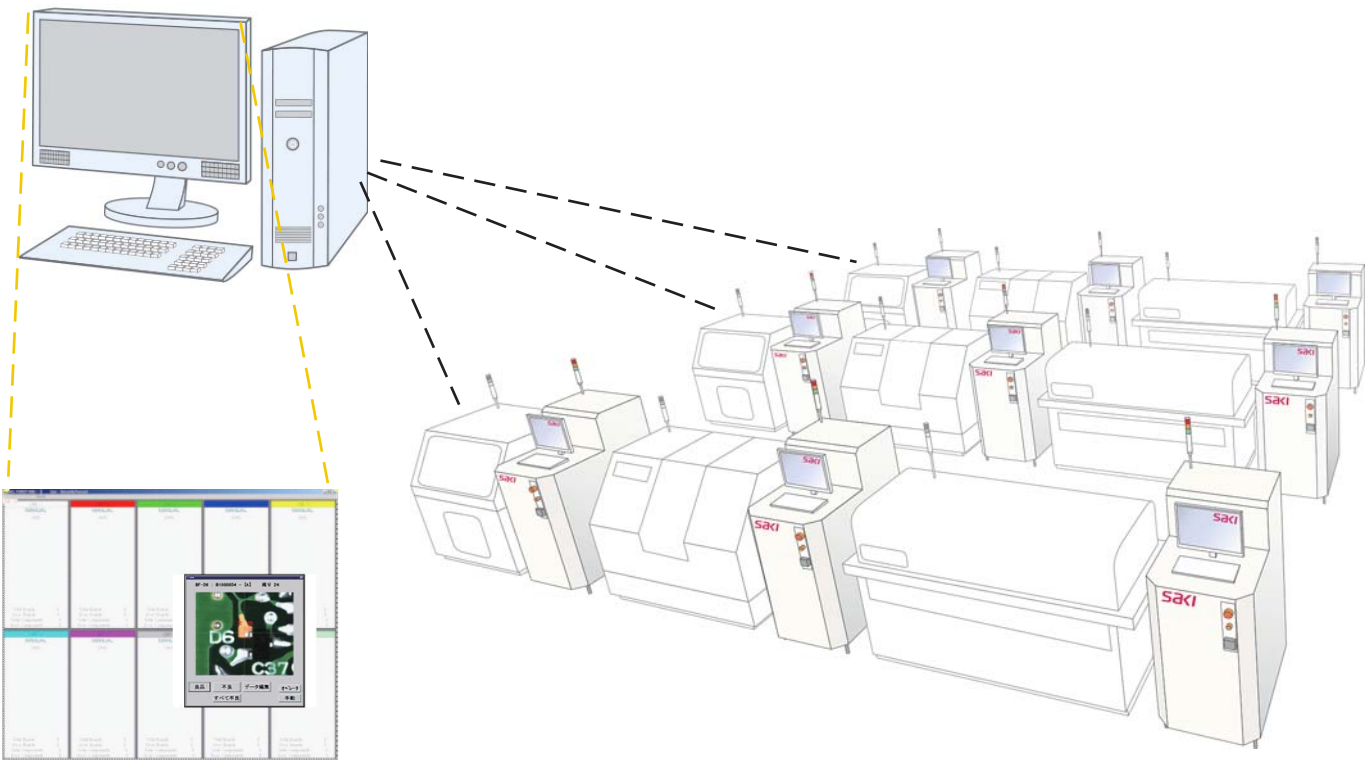**3.** Printer

Shows a location of a defect
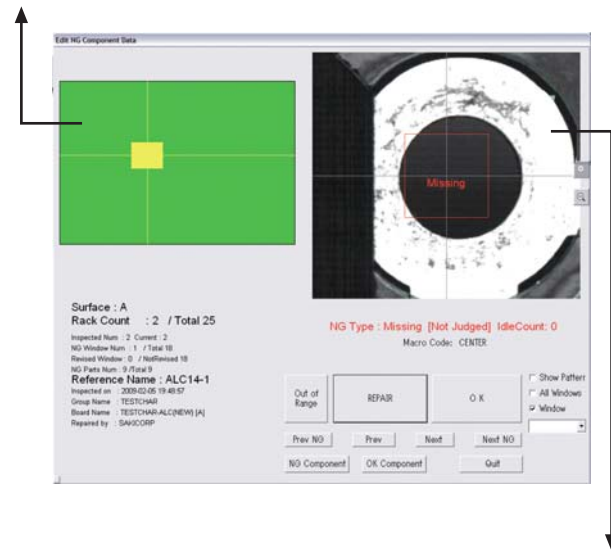
Enlarges the area judged as NG (Possible to show an image in full color)
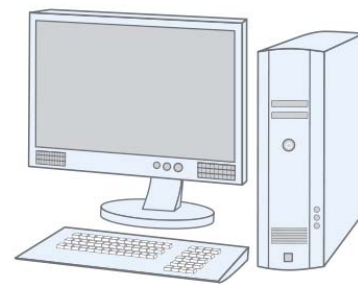
BF-RP1

BF-Monit or Simultaneous Management of Inspection Systems

Enables you to remotely control several inspection systems with one terminal

Rechecking Components Intensively

BF-Monitor collects defects that in-line inspection systems detect in real time. You can evaluate the collected defects by remote control. BF-Monitor can show inspection results for several lines. This feature enables you to minimize man-hours of operators and production costs. You can enhance the quality of production lines by identifying actual defects and false calls from defect images shown in real time.
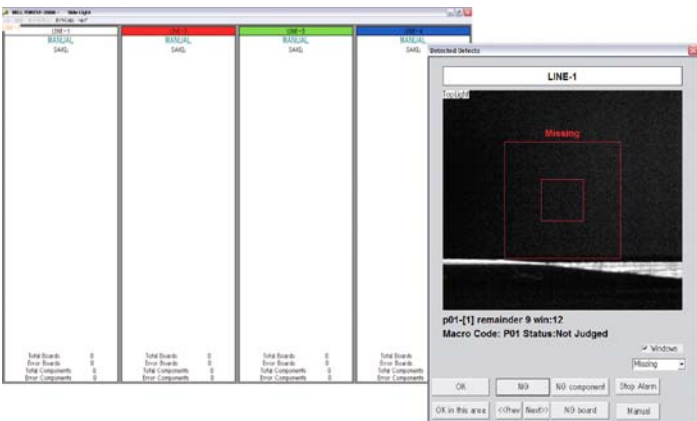
BF-View Real-time Process Managing

Monitors production quality and operating conditions of AOIs

TO BE RENEWAL

Displays production volumes and both of the numbers of false calls and actual defects for each line

Manages quality trends for each line

Shows percentages of false calls and actual defects for each defect and component type.

You can easily output reports (monthly report, daily report, report for each lot and report for each PCB) from the database. With the reports, you can check component types, libraries, AOI judgments, OP judgments, time and repair histories.