



MAKER-RAY

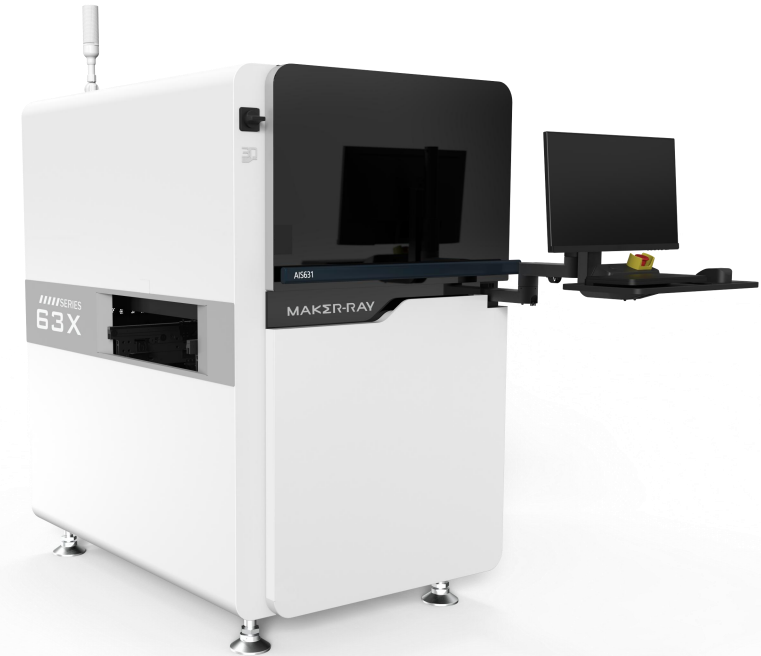
AIS63X-HW

Inline Solder Paste PCBA 3D Optical Inspection Equipment

AIS63X-HW

Detect solder paste defects such as insufficient solder, excessive solder, icicle, thickness, etc.

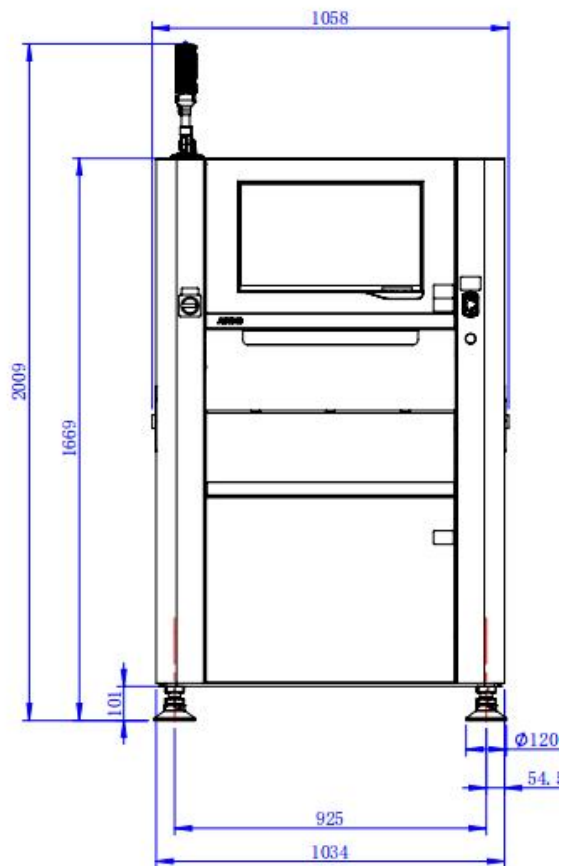
MAKER-RAY 3D SPI AIS63X uses **high-precision and high-speed industrial cameras** and professional optical imaging systems, combined with image processing and visual recognition technology of deep learning algorithms, to **truly restore the 3D image** of objects, and realize the inspection needs of more scenarios through diversified inspection algorithms; coupled with a scientifically designed **high-precision hardware platform**, the whole machine runs fast and stable, while ensuring inspection capabilities, comprehensively improving production efficiency.



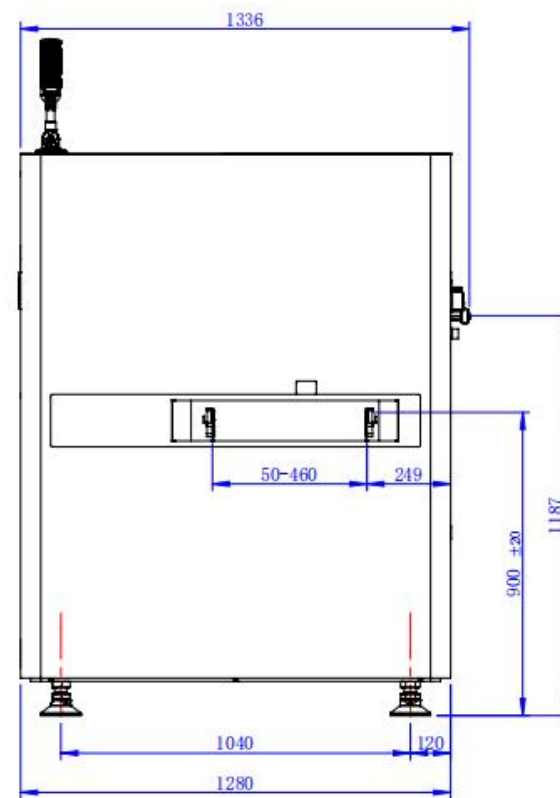
*AIS631-HW

AIS63X Architecture Diagram

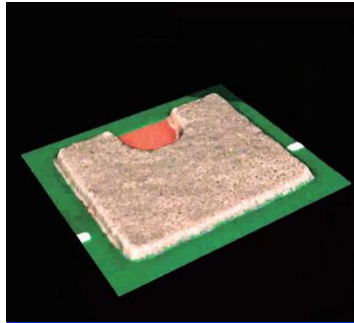
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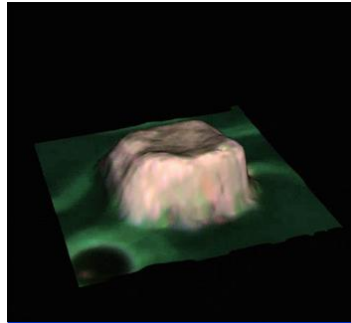
*AIS630B-HW



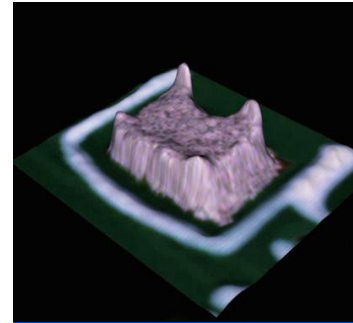
Unit, mm



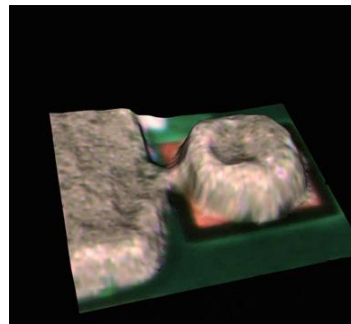
OK



Excessive solder



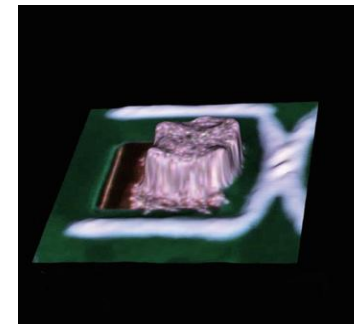
Solder Projections



Bridgel



Insufficient solder



Offset

High-precision imaging solutions

Integrating AI intelligent denoising, it restores the real and objective solder paste imaging. Researched special light source solution enables SPI to adapt to the recognition of PCB pads of different colors and materials, improving the imaging accuracy.

Strong anti-interference, high detection, low false call

The self-developed AI algorithm has strong generalization and anti-interference capabilities, can clearly distinguish between fine solder silk and silk screen features, and effectively detect icicle

Easy-to-learn programming

Supports AI to auto-generate images of solder paste on the entire board; Supports programming with or without GEBER by one-click

Advanced hardware platform ensures detection speed

The device side can autonomously train special defects and solder patse sample, continuously iterate recognition capabilities, and improve detection accuracy

SPC Statistics

SPC statistical data has rich dimensions and various presentation forms, supports docking with MES system, and meets the needs of data statistical analysis

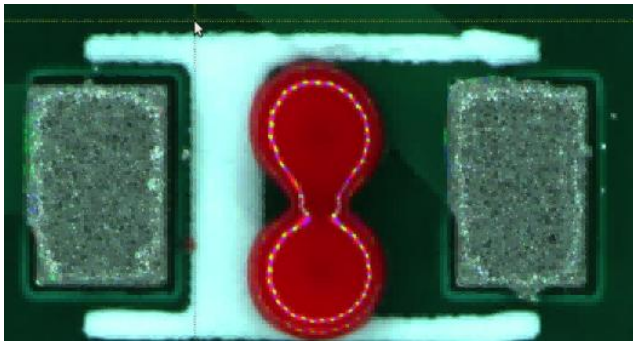
Intelligent interaction, automated collaboration

It can exchange information with printers, placement machines, etc. through industrial standard communication protocols such as Smema and Hermes to improve process optimization efficiency

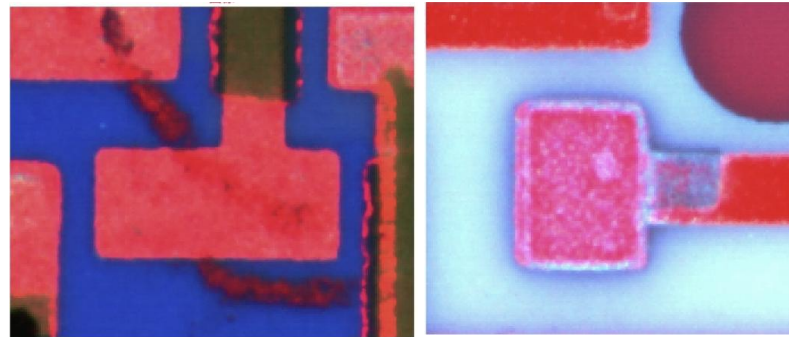
Special-tuned lighting technology to enhance visibility of surface features

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The **special-tuned light source technology** enhances the visibility of the surface features of the object being measured, allowing SPI to **flexibly adapt to the identification of PCB solder** pastes of various materials and colors, improve the 3D imaging quality of the object being measured, and provide a solid imaging foundation for the detection accuracy of 3D SPI.



*Red glue and solder paste process imaging



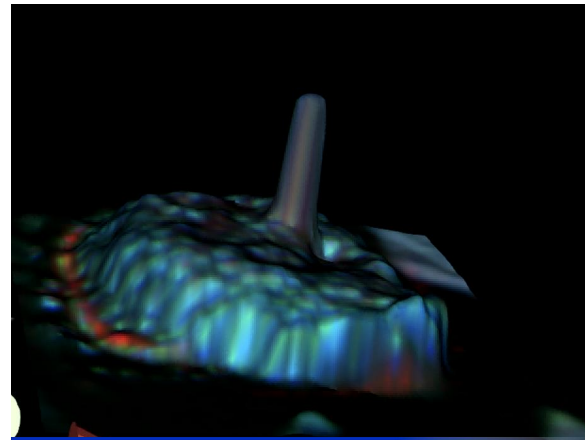
*Ceramic plate slurry process imaging



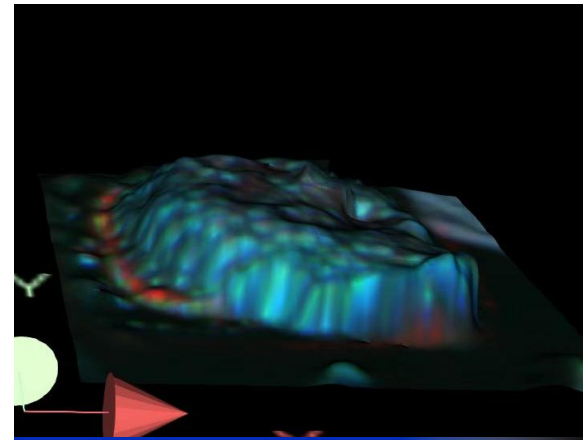
AI intelligent denoising restores the true shape of solder paste

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Solder paste has a metallic aversion property. The refraction of light at certain angles will produce a reflective effect, thereby generating imaging noise interference. MAKER-RAY 3D SPI **integrates AI image processing technology** and field filtering algorithms to intelligently distinguish between noise and real solder paste tips, improve measurement accuracy by removing noise interference, and **effectively reduce false calls**.



Before denoising



After denoising

Dynamic adaptive reference wrapped pcba compensation

The reference surface is established and **calibrated through algorithms**, and the position and shape of the reference surface are dynamically adjusted to **adapt to the deformation of the wrapped PCBA**. Ensure that the solder paste height measurement results are stable and accurate.

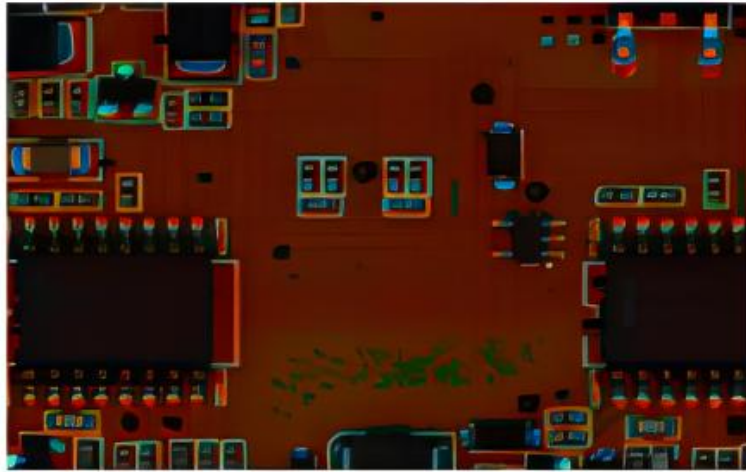
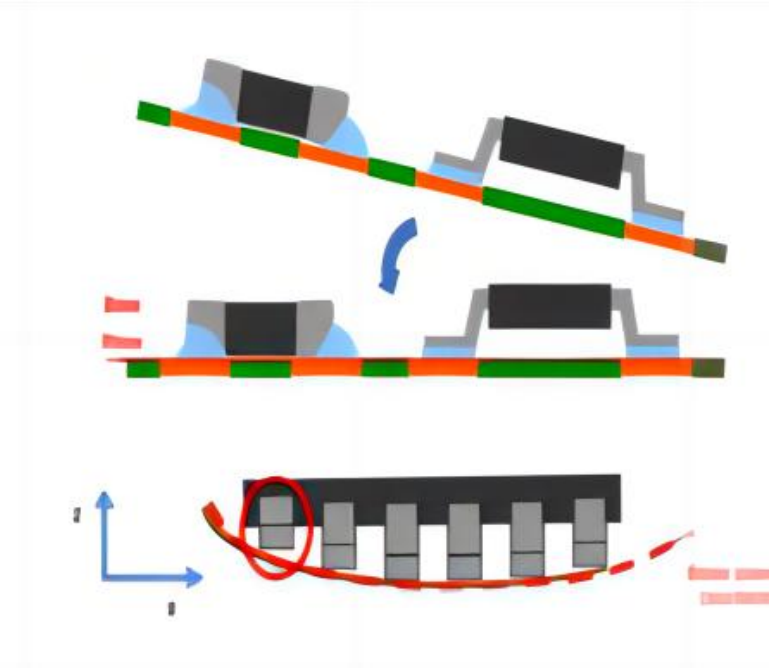
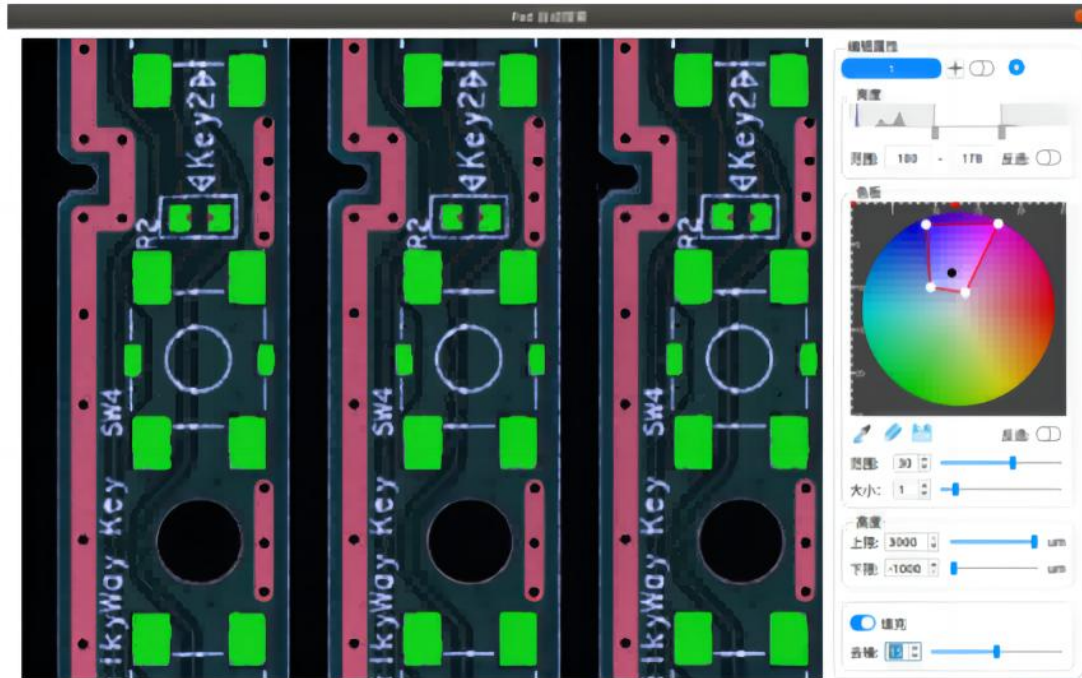
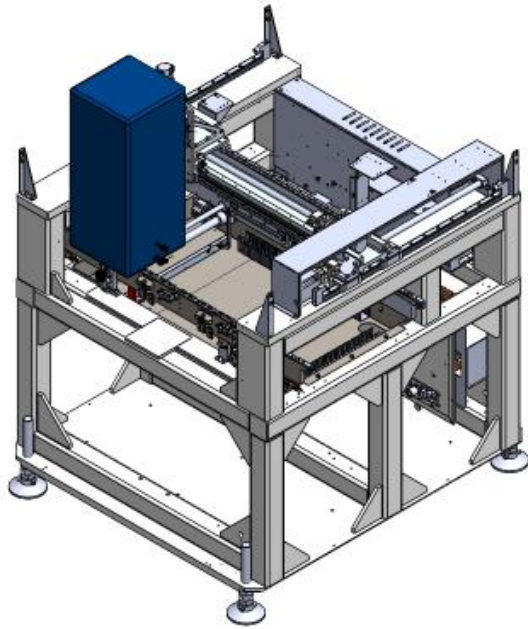


Diagram of reference surface correction





- AI Programming: One-click generate whole board image. Intelligent call-up parameters. Not rely on operator experience. Ensure higher program consistency
- Import GERBER: Importing files can automatically generate detection frames, saving programmers' operation time and improving programming efficiency
- Support without GERBER: Quick programming without Gerber is supported



- Integrated welded frame improves overall strength and reliability, eliminates precision errors caused by assembly, and meets SPI imaging stability and accuracy requirements
- Optimize and adjust the motion parameters according to the mechanical characteristics of the equipment make sure the whole machine running faster and more stably
- The core parts adopt international first-line brands to improve the performance of the whole equipment

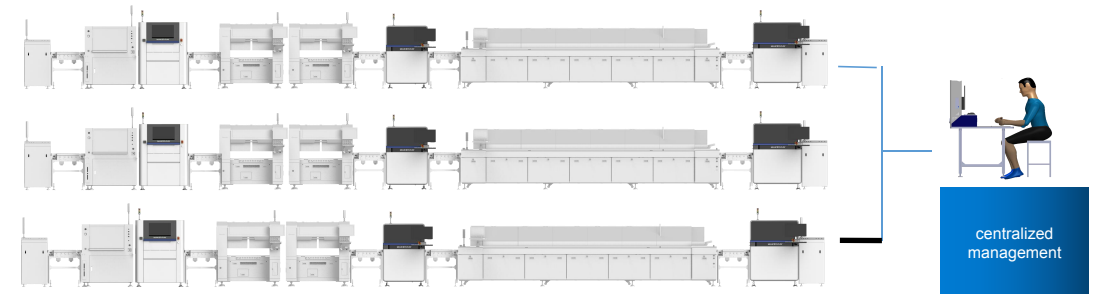
➔ **Unlimited time and space, convenient management and improved efficiency**

➔ **Call program Remotely support convenient debugging**

Program of any AOI in local area network can be called without manual copying, without geographical space restrictions, more convenient and faster

➔ **Quick line change to meet the needs of multiple models**

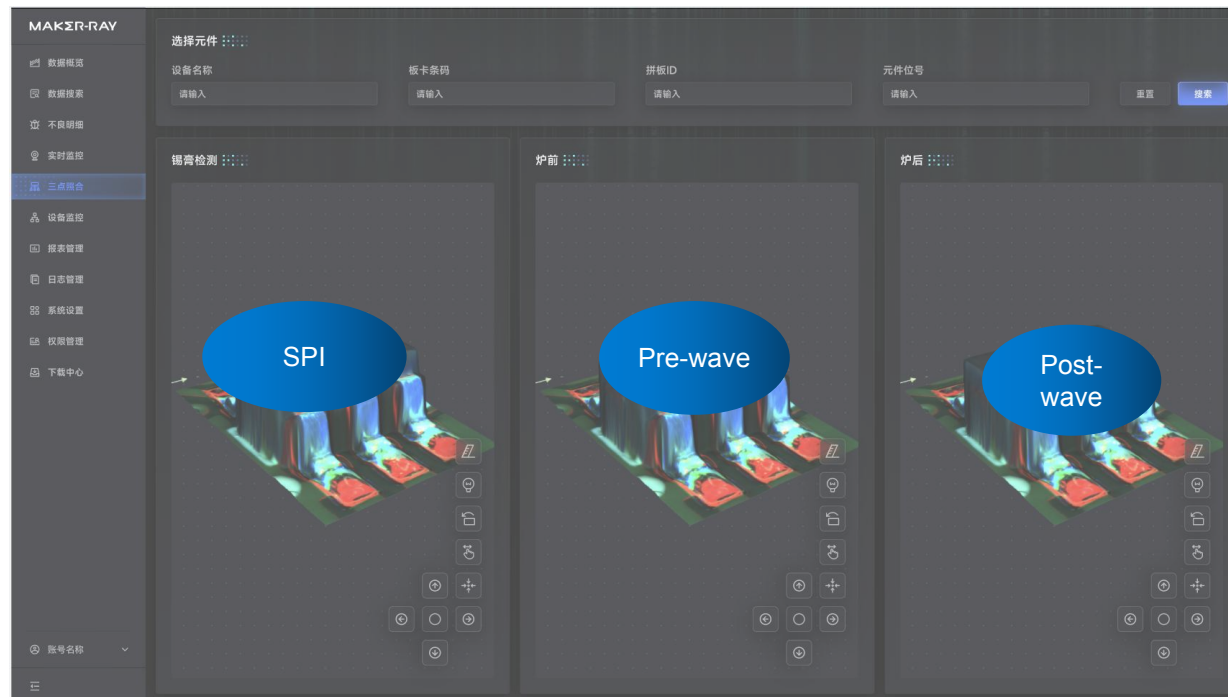
By identifying the machine model barcode, the program is automatically switched and the track width is adjusted to achieve unmanned line change, which can cover all directions and all time periods, and greatly improve efficiency

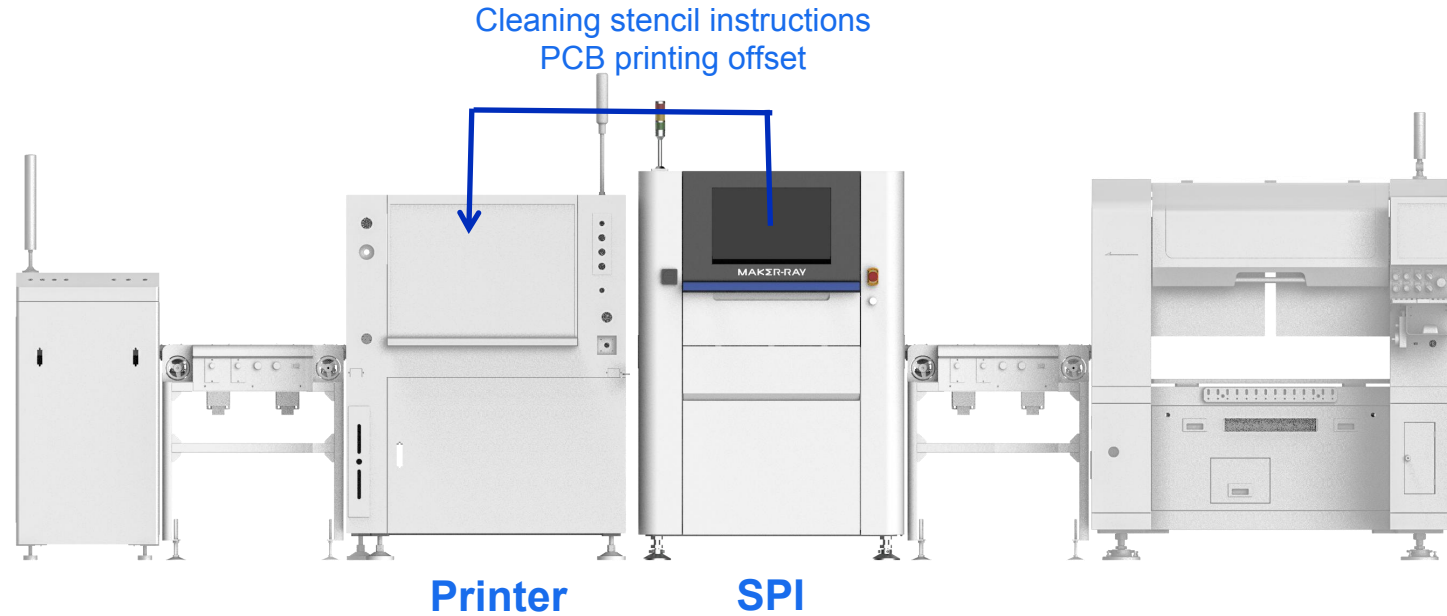


Integrated Link loop assist quick location of root of defects

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By integrating the inspection data of SPI, pre-reflow AOI and post-reflow AOI through three-point integration, **product defects can be quickly analyzed**, the root causes can be located, and engineers can be helped to formulate targeted improvement measures. AOI not only plays a role in intercepting defective products, but also helps customers diagnose defective products, thereby **improving the defective product situation and increasing the yield rate of the production line**.





1. After SPI detects missing, it sends a command to the printer to clean the steel mesh, and **the printer automatically performs the steel mesh cleaning action.**
2. SPI transmits the XY axis offset found in the test to the printer. After reading it, **the printer determines whether correction is required** (multiple pieces can be referenced and determined by the printer user), and executes the preset action to improve printing quality and reduce unnecessary solder paste loss.

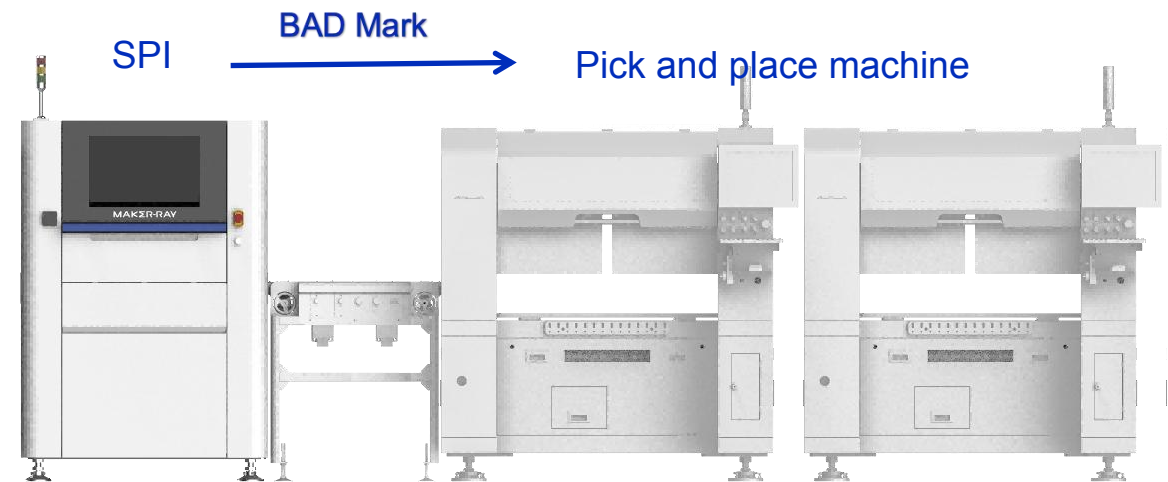
*Prerequisite: The printer needs to open the communication protocol to SPI, and the R&D of both parties confirm in advance that the data can communicate. At present, the domestic and GKG and Desen printers have achieved closed-loop control

■ Badmark sharing between SPI and placement machine

SPI transmits the detected bad board information to the placement machine. After receiving the relevant information, **the placement machine directly skips the bad board and proceeds with placement**, thus saving the placement machine's time to identify each sub-mark, greatly **improving the placement efficiency when multiple panels are assembled**.

*Implementation conditions: Since each board information needs to correspond one to one, a barcode needs to be mounted or printed on each PCB. SPI needs to be equipped with a barcode recognition module

*Prerequisites: The placement machine must open the communication protocol to SPI, and the placement machine needs to be equipped with the Badmark function for communication with SPI. Placement machines usually require additional charges



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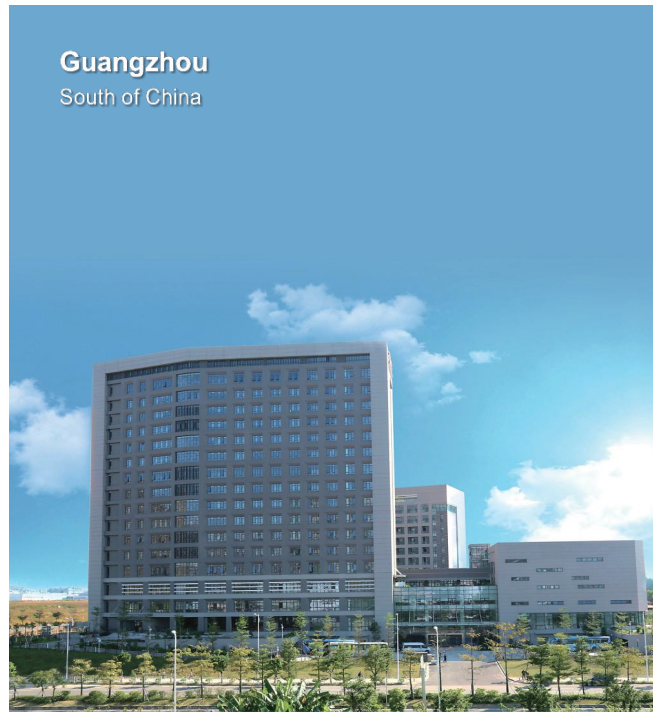
About Us



MAKER-RAY MAKER INDUSTRIAL INSPECTION EASIER

MAKER-RAY

MAKER-RAY focuses on the field of optical inspection in the **PCBA production process**. It is a high-tech enterprise integrating R&D, sales, and services. It adheres to the mission of "making industrial inspection easier", **drives innovation with technology**, and applies **deep learning algorithms to AOI** to provide companies with competitive optical inspection solutions.



Complete Product Layout

MAKER-RAY

Dual in-line Package Inspection (THT)



Pre-Wave AOI



Post-Wave AOI



Double Sided AOI



Inline Repair Station

Surface Mount Inspection (SMT)



2DAOI



3DAOI



3DSPi

Surface Coating Inspection (Coating)



Single Sided CCI



Double Sided CCI

Three Institutes and One Research Station Provide Strong Support for Technology-driven Growth

MAKER-RAY

Academia Sinica

Over 10 years of experience in AI algorithms and machine vision, achieving innovative breakthroughs from traditional algorithms to AI algorithms

Central Academy of Engineering

Conduct research on engineering materials, innovative processes, standardized modular design, and simulation calculations to improve the reliability of equipment design

“3+1”

Innovation Design Institute

Conduct user scenario and human interaction research, gain insight into user pain points, provide design and experience solutions, and create an extremely user-friendly interactive experience

Postdoctoral Research Station

Obtained the qualification of Guangzhou Postdoctoral Innovation and Practice Base, established cooperative relations with well-known domestic and foreign universities and research institutions to ensure the supply of talents

Growth Curve

MAKER-RAY

Drives innovation with technology to provide companies with competitive optical inspection solutions.

1200%

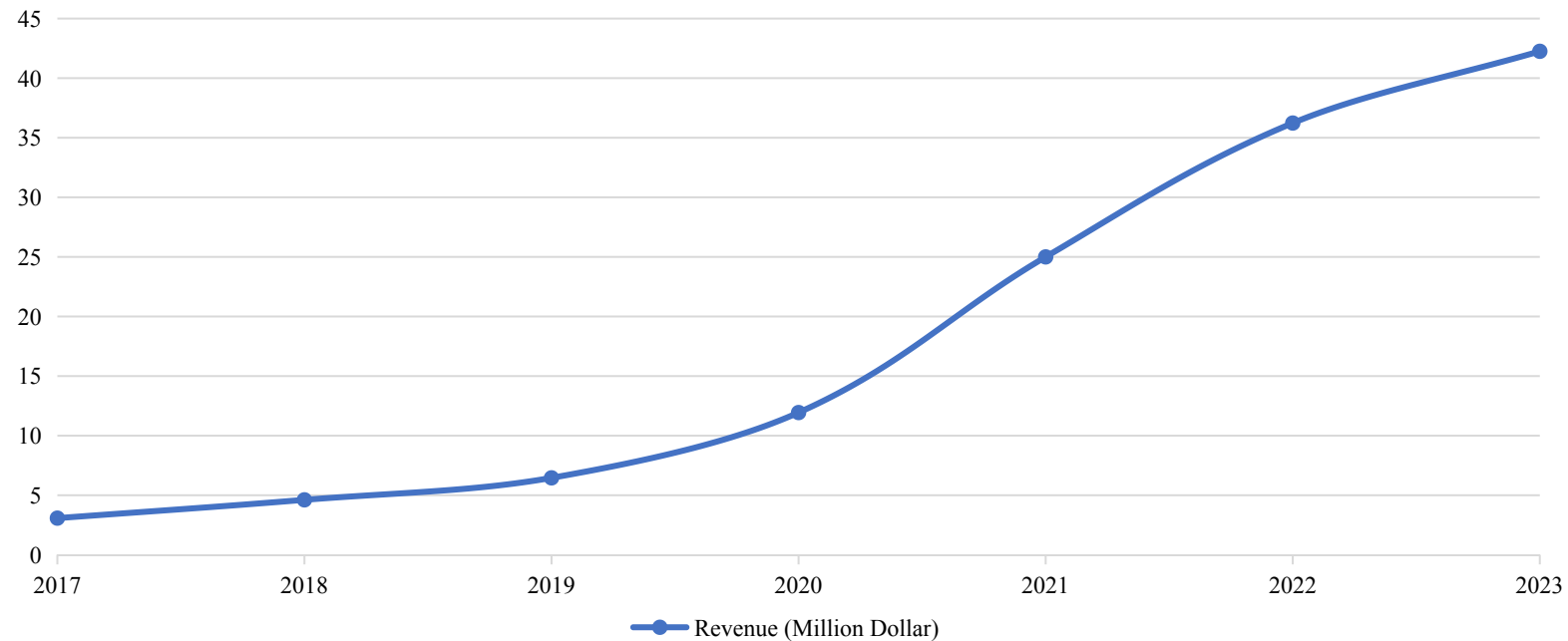
5 years of
performance growth

80%

Compound
Growth Rate

TOP 500

The choice of
world's top 500 companies



Complete After-sales Service System

MAKER-RAY

Maker-ray has been deeply involved in the industry for **more than ten years** and has established **more than 10 service** areas across the country and **20 service areas worldwide**. Its business scope covers **more than 200 cities** across China as well as many overseas regions including **Europe, America, Africa, and Southeast Asia**.



*Data as of December 31, 2023

Marketed at Home and Abroad Used by Thousands of Factories

MAKER-RAY



MAKER-RAY Trusted by Them

MAKER-RAY

Home Appliance	 FOTILE 方太 回爱伟大	 Midea	 CHANGHONG 长虹	 Haier 海尔	 HMD [®] 广东华美达电器有限公司	 Panasonic 松下电器	 SKYWORTH 创维
Consumer Electronic	 SUNWODA 欣旺达	 MITAC	 RAMAXEL 亿芯	 HKC 惠科股份	 HEG 海格科技	 Simand 新安电器	 ASUS Rock Solid · Heart Touching
Security and Defense Communication	 FiberHome	 dahua TECHNOLOGY	 HIKVISION	 FLY	 Phenix 凤凰	 CTI 华测检测	 IPW
Power Supply	 林洋能源 LINYANG ENERGY	 Huntkey 航嘉	 MW MEAN WELL 明纬电源	 GOSUPER 高斯宝	 台达 DELTA Smarter. Greener. Together.	 EAGLE RISE 伊戈尔电气股份有限公司	 迈思普电子有限公司 MASS POWER ELECTRONIC LIMITED
Vehicle Electronics	 BYD 比亚迪汽车	 明世电子 www.mshdz.cn	 中国中车 CRRC	 上海电驱动	 MASS POWER	 Valeo 法雷奥	
Instrumentation	 精创股份 — Since 1996 —	 e 顿顿 EDON	 NARI 国电南瑞	 永泰隆 YTL	 中信华 ZHONGXINHUA	 许继集团	 Ceyear 思仪
Industrial Control	 洲钜科技	 Inovance 汇川技术	 axxon simple and smart	 ORIGIN	 SIEMENS	 yytek 云浦科技	 C&D
EMS	 伟创力集团 FLEXTRONICS	 安费诺 ANFEINUO	 LuXshare 立讯精密工业	 英业达 Inventec	 wistron 緯創資通	 深科技 KAIFA	...



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AI+AOI

Make Industrial Inspection Easier