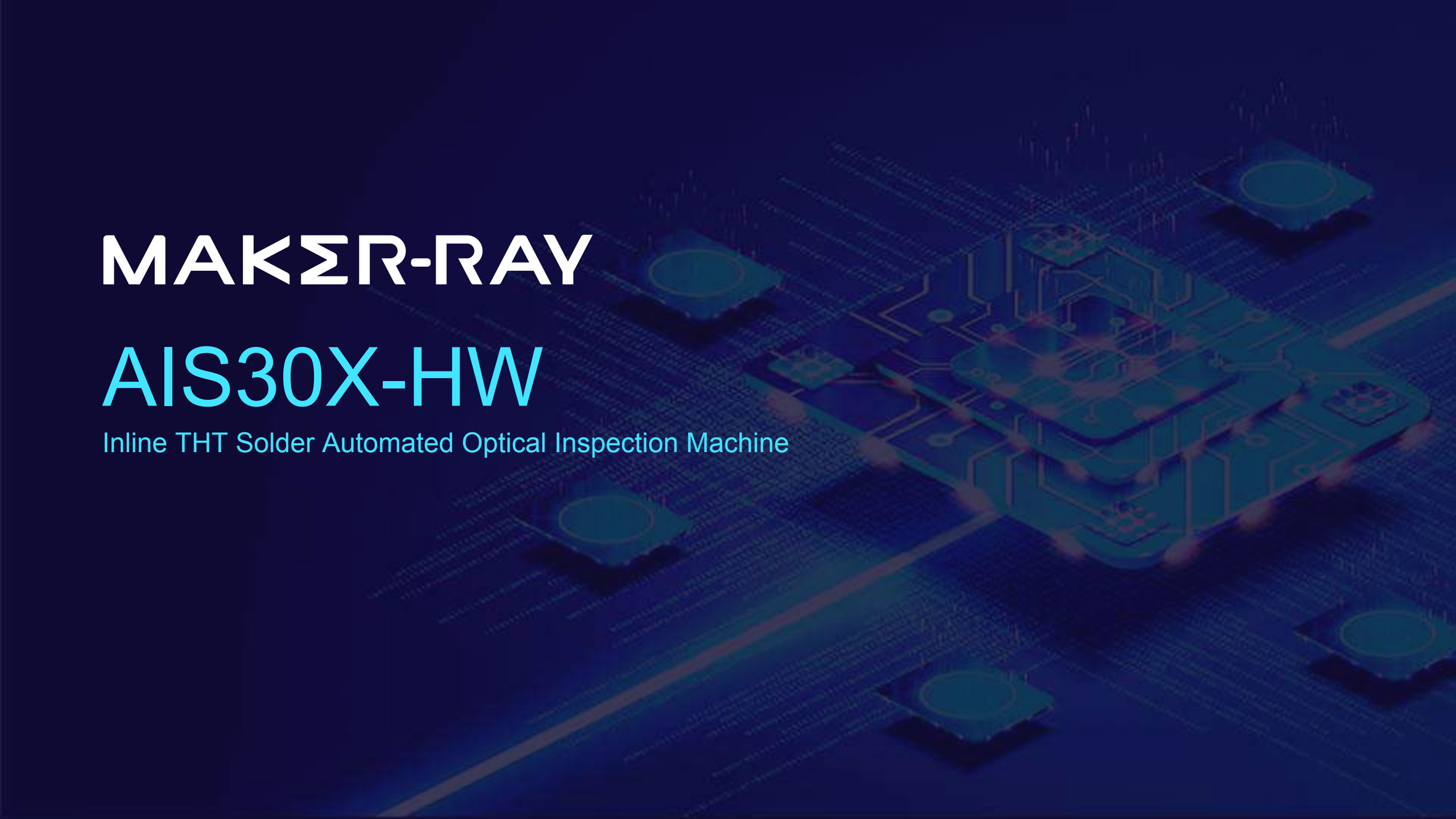
MAKER-RAY

AIS30X-HW

Inline THT Solder Automated Optical Inspection Machine



Traditional Production Line without THT AOI

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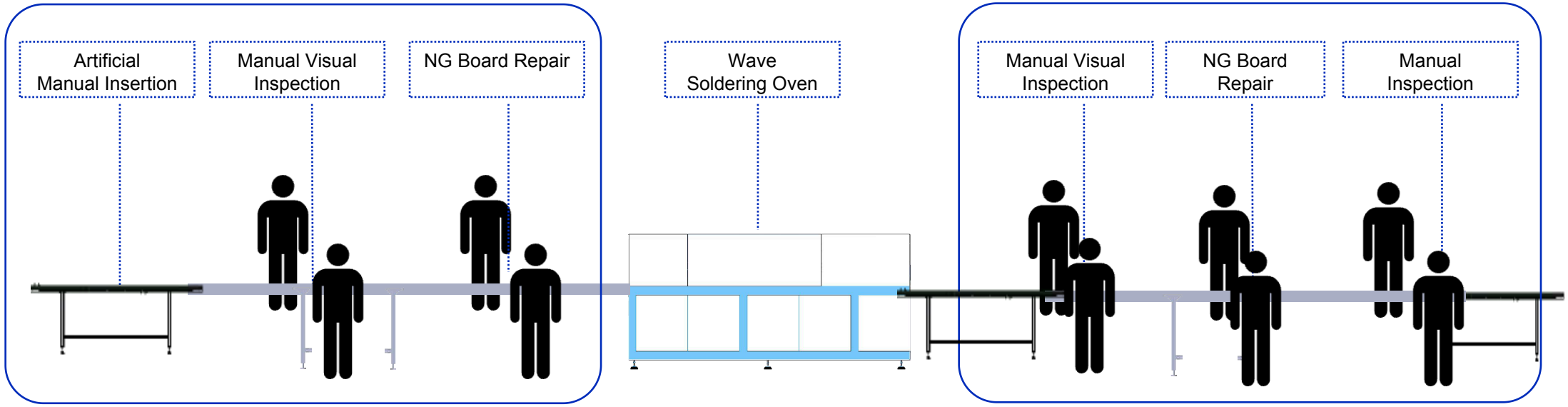

Pre-wave

Post-wave

Challenges We Met on Manual Insert Component

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01

Serious Consequences of Missed Inspection of Solder

NG soldering lead to short, potential safety hazards and others, so 100% detection is crucial。

02

Long Programming Time

Vrious solder joint defects. Conventional algorithms require drawing frames and extracting colors one by one, which takes a long time to program and debug.

03

Difficulty in Solder Joint Inspection

Solder joint morphology varies greatly. Conventional color extraction algorithm is easily disturbed, resulting in missed inspection and false call。

THT Production Line with THT AOI

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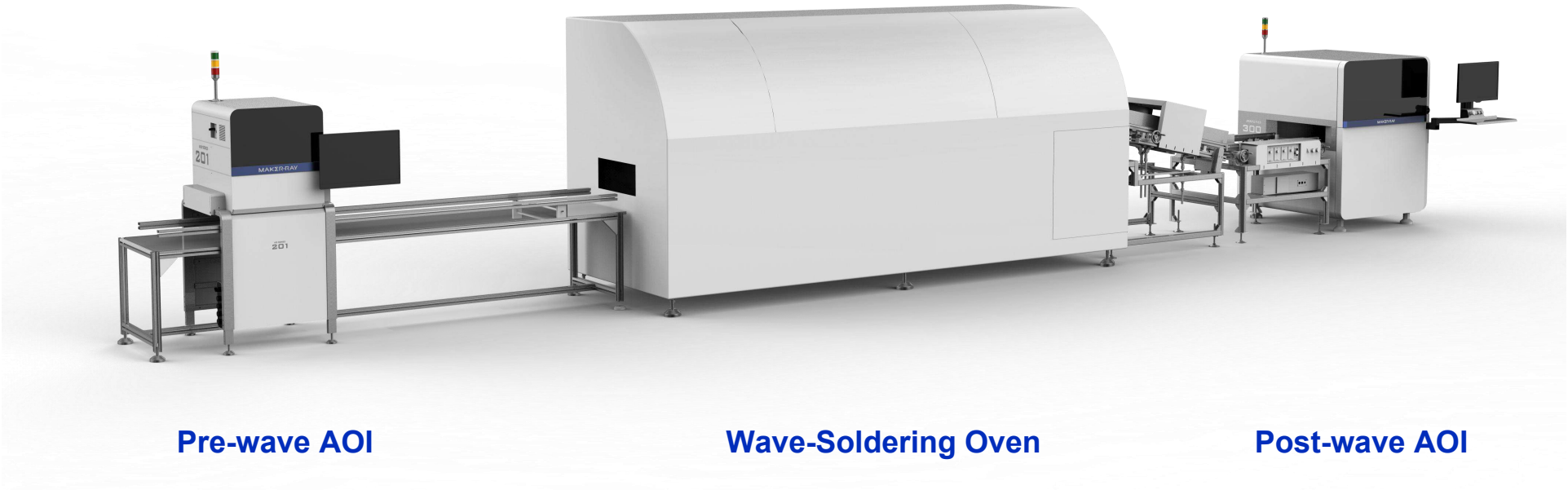

Pre-wave AOI

Wave-Soldering Oven

Post-wave AOI

MAKER-RAY Post-Wave THT AOI

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AIS30X-HW

Inspect THT Solder joints defects at bottom

97%

AI intelligent algorithm covers more than 97% of inspection items

Soler hole

Extract tens of thousands of solder hole defect features in multiple dimensions, with strong inspection capability

5 min

Intelligent programs in just 5 minutes

Inspectable Defects

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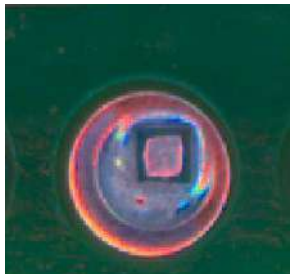
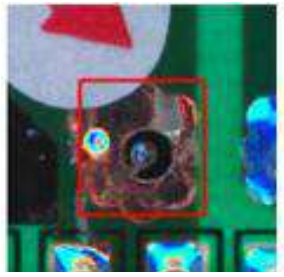
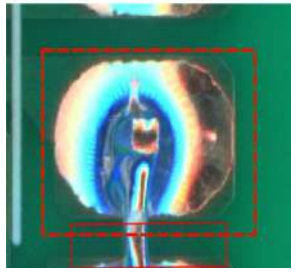
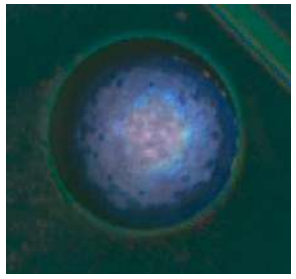
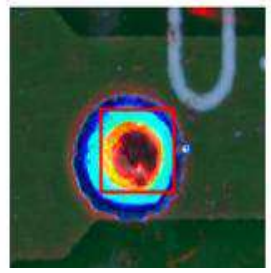
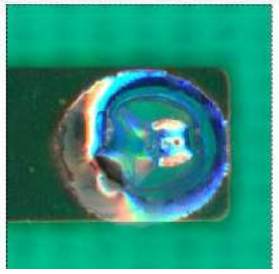
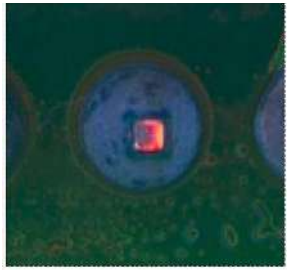
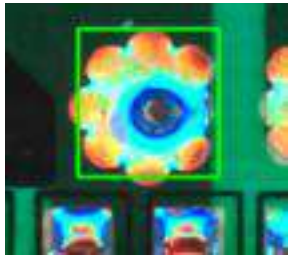
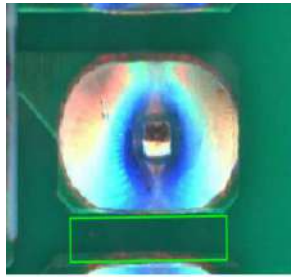
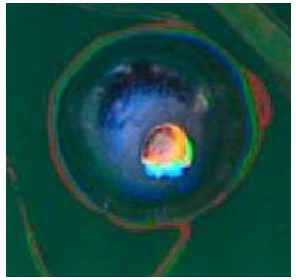
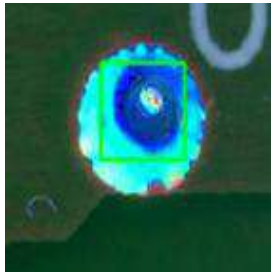
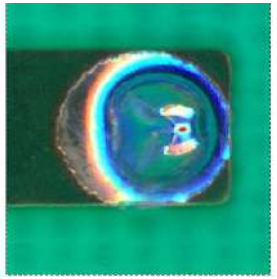
	Insufficient Solder	Exposed Copper	Bridging	No Foot	Wrapped Solder	Solder Hole
NG						
OK						

AIS30X-HW Architecture Diagram

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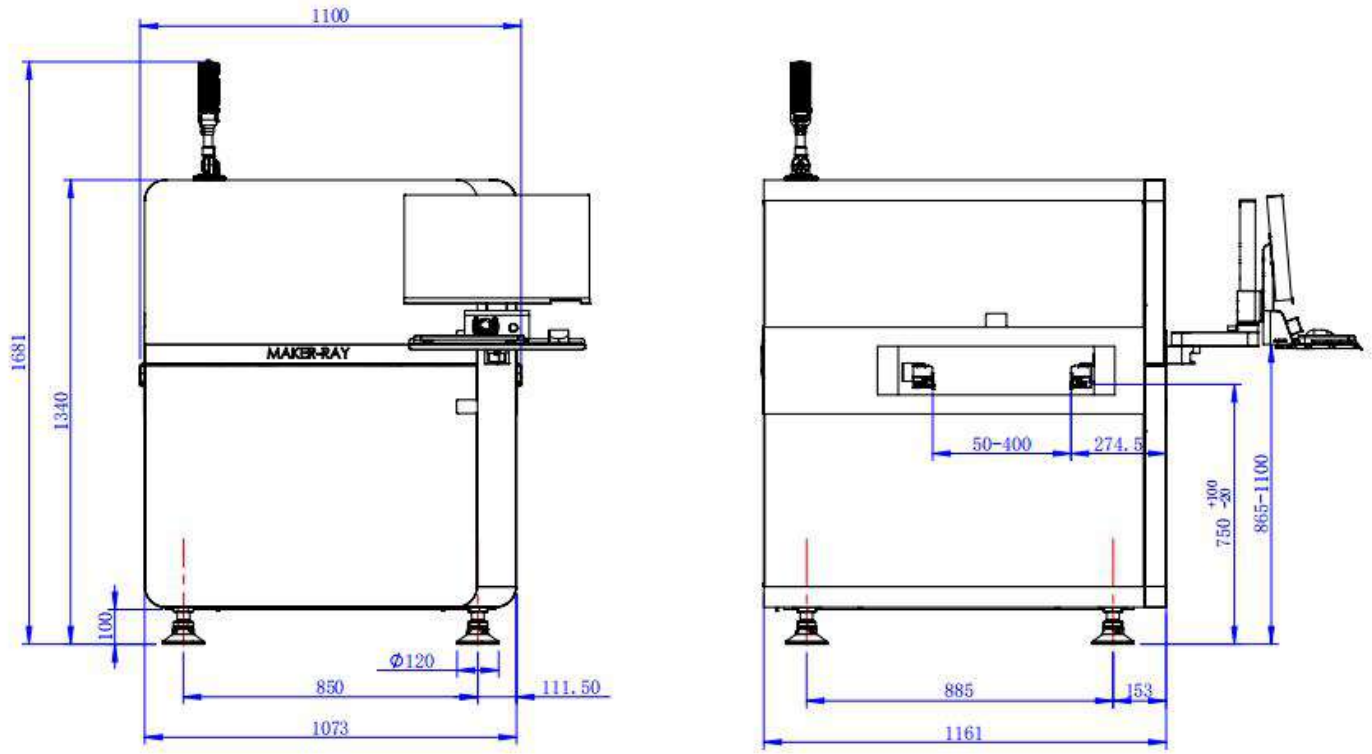
Professional designed to ensure product performance while reducing the size of the equipment. **Light and simple shape** to make production line layout more flexible.



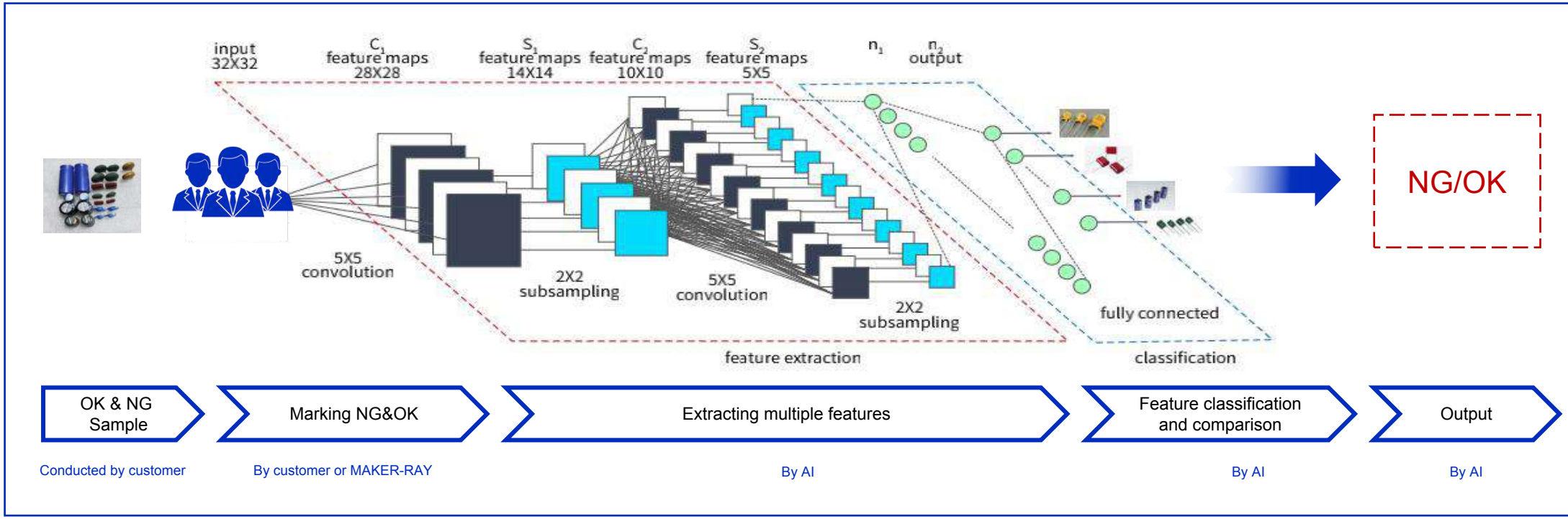
*AIS303B-HW

Unit, mm

Core Technology: AI Deep Learning Algorithm

MAKER-RAY

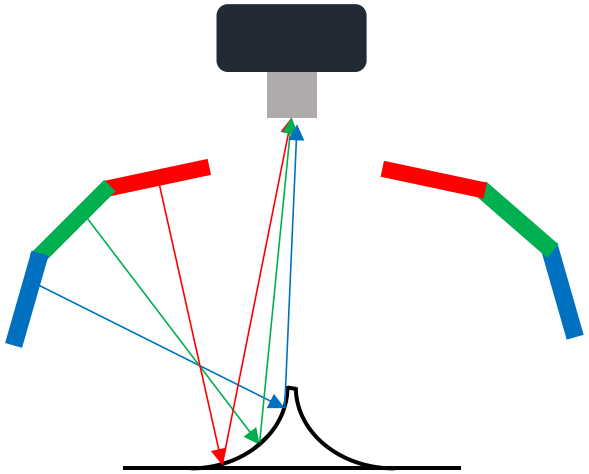
The convolutional neural network algorithm is used to recognize images, **extract** image **features** for learning and training, realize **one-click** automatic identification of components, and **intelligently** judge defects.



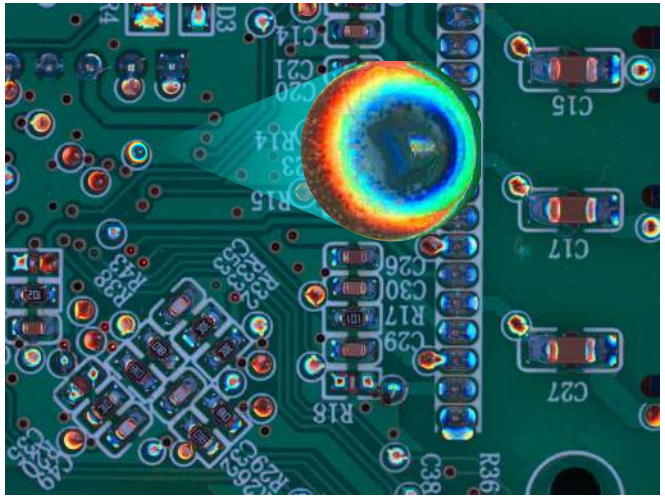
Core Advantage: Professional Multi-color Integral Light Source. Truly Restore Solder Joint Shape

MAKER-RAY

RGB light sources at different angles can accurately reflect the surface slope information of the object, making the stratification of solder joints **more obvious and clearly showing NG soldering**.



Multicolor RGB Light source Irradiation



Highlight the 3D information of solder

Core Advantages: Intelligent Programming, Efficiently Leading the Industry

MAKER-RAY

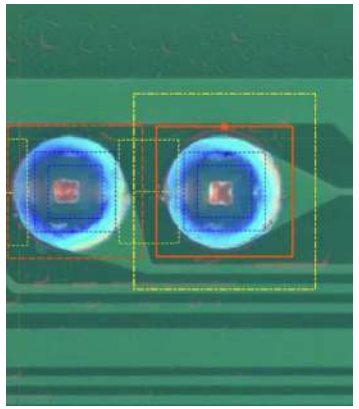
Based on big **data + AI deep learning algorithm** training, it covers more than 90% of solder joint models, realizes automatic identification and parameter adjustment of solder joints on the whole pcba. Easy to operate. Not rely on engineer experience. **Improves line change speed. Saves manpower.**

Conventional Algorithm		AI Algorithm
1 hours	Programming Time	5 minutes
30 minutes	Debugging Time	10 minutes
/	Labor Costs	↓ 50%

*Take the programming for the same board by same person as an example

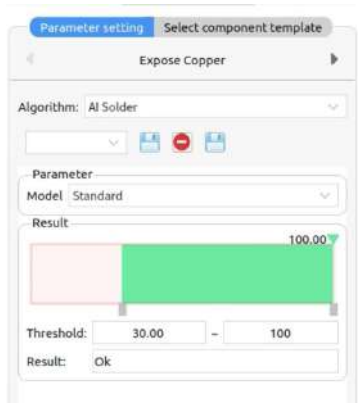
Intelligently configure algorithm

Verify the type of solder joint to be detected to configure the algorithm



Automatic identification of solder joints

One-click search for solder joints and draing the inspection boxes on the entir board automatically



Intelligently bringup parameters

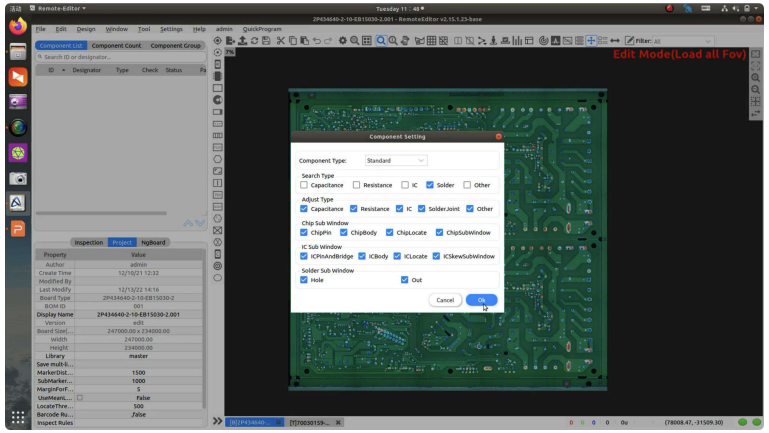
Intelligently configure parameters by default. Can also be adjusted manually

Core Advantages: Intelligent Programming, Efficiently Leading the Industry

MAKER-RAY

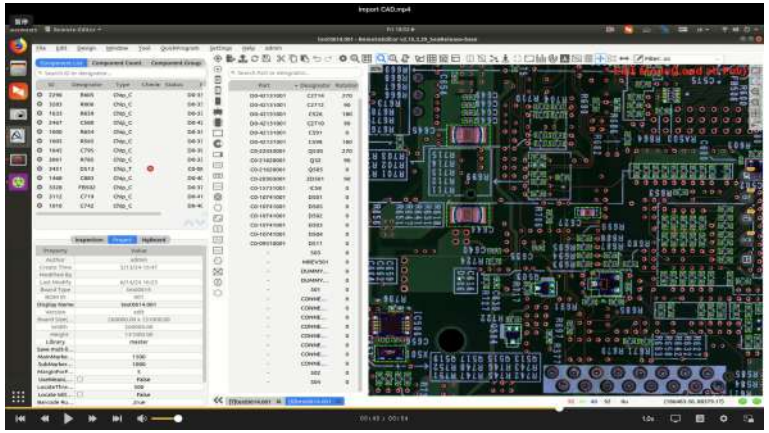
Algorithm Management Tool

Algorithms library can be personalizedly setup according to the inspection scenarios. Improve programming efficiency and accuracy



Component Library Synchronization

Supports auto-matching with CAD, and synchronizes the parameters programmed by AI search to the component library for subsequent use.



Core Advantages: Multi-dimensional Feature Extraction Supporting Stable Identification of Difficult Items

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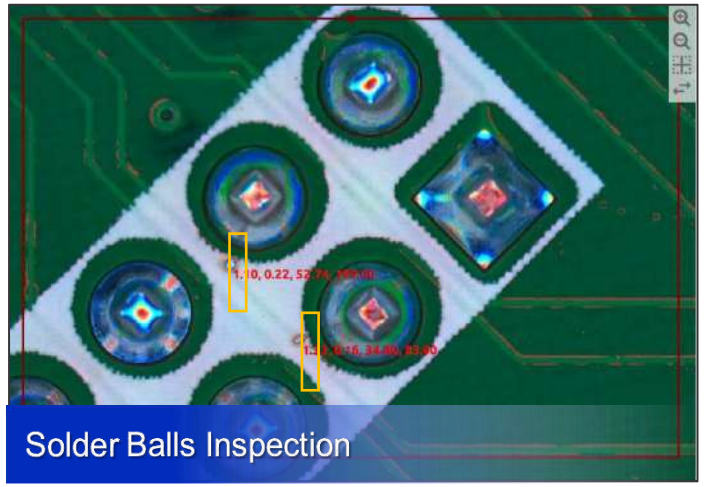
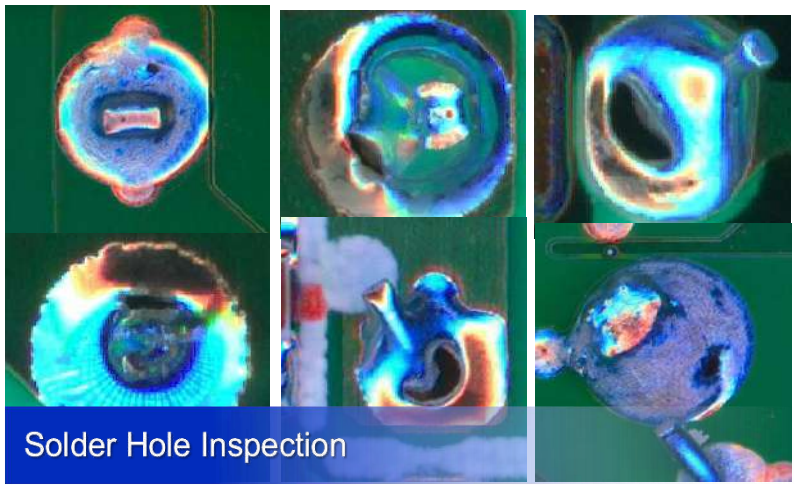
The model trained based on big data has **strong detection and generalization capabilities**, which can ensure the inspection caused by diversified deviations of solder joints, and solve the problems of missed inspection and false calls caused by large changes in solder joint components and susceptibility to the influence of pins and components.



No manual intervention is required, and it is not affected by silk screen printing or dirt. It can intelligently identify the solder balls, size and position of the entire board.

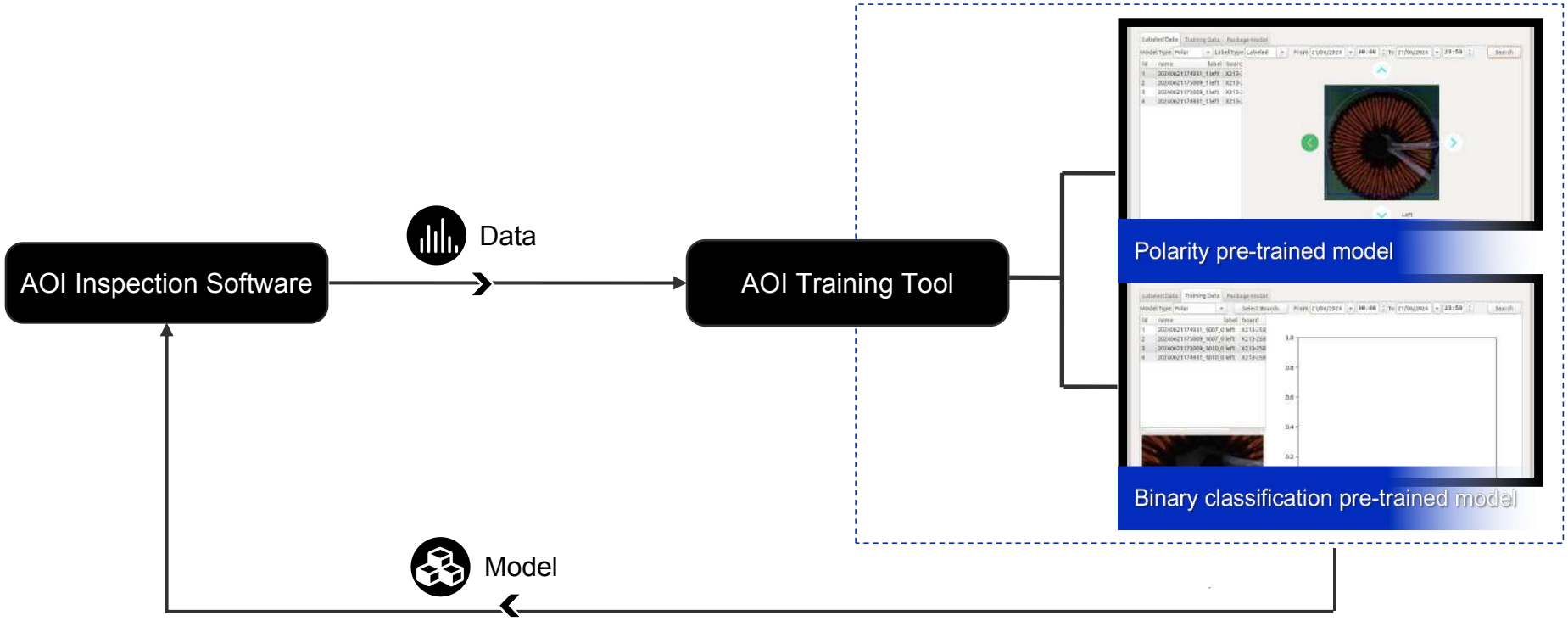


Covers various hole shapes, with strong anti-interference and generalization capabilities.

Core Advantage: AI Self-training and Continuous Upgrading of Inspection Capabilities

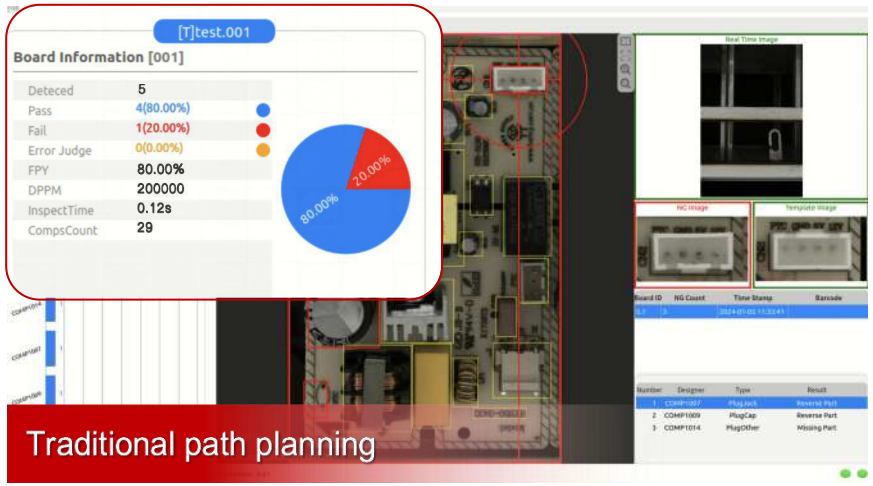
MAKER-RAY

The machine can conduct AI training autonomously, allowing the device to quickly **learn new and special components**, continuously iterate recognition capabilities, and improve inspection capabilities.

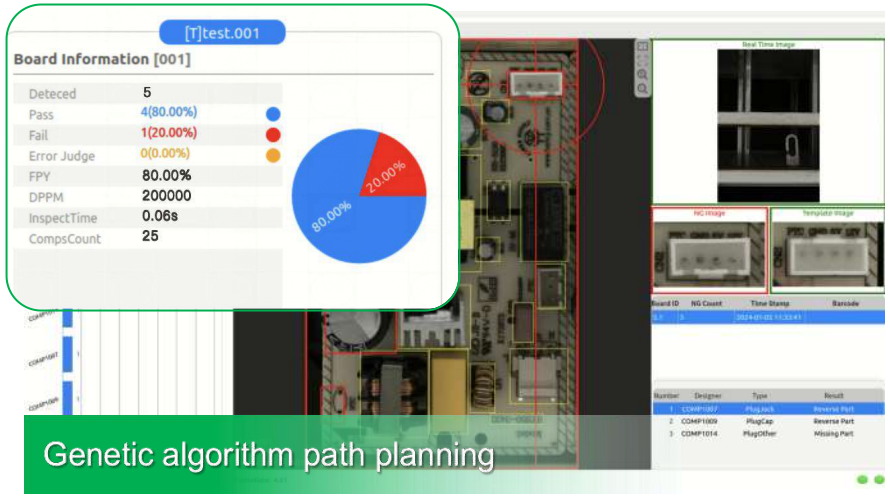


Core Advantages: Genetic Algorithm Path Planning, Faster Inspection Speed

MAKER-RAY



Upgrade the traditional path planning to intelligent planning path. Auto-filter the positions without solder joints, take pictures quickly to reduce the number of FOV, and make the inspection faster.

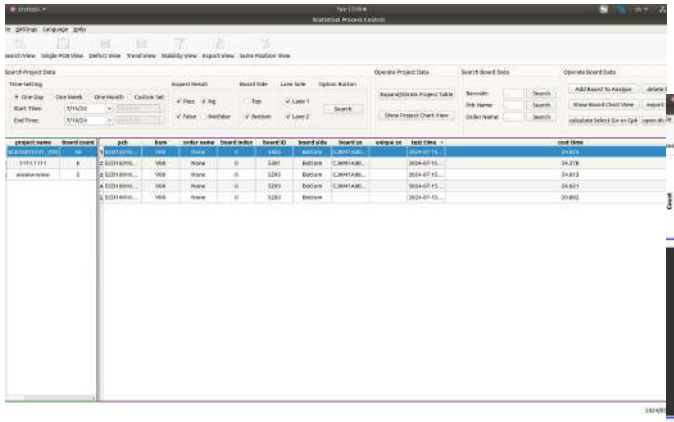


- **Traditional path planning** requires 29 FOVs, and the total inspection time needs 0.12s
- **Genetic algorithm path planning**, only 25 FOV needed with 0.06s. Speed increased by 50%

Core Advantage: Complete SPC Data to Empower Production Management

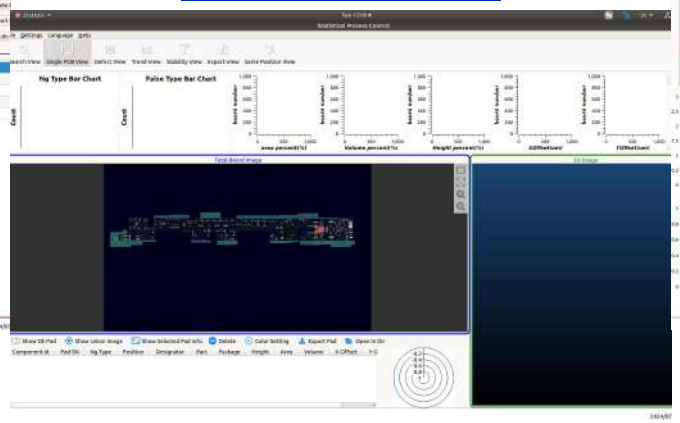
MAKER-RAY

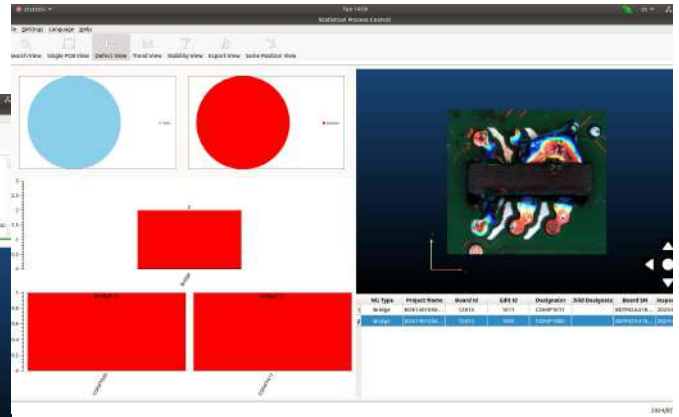
The inspection data is retained in real time, and **rich data statistics and analysis charts** are provided. It supports exporting or connecting to MES system detailed data reports to help enterprises trace production and improve processes.



Inspection Statistics

Defect Statistics





Defective Details

Core Advantage： Rich Inspection Modes. More Practical

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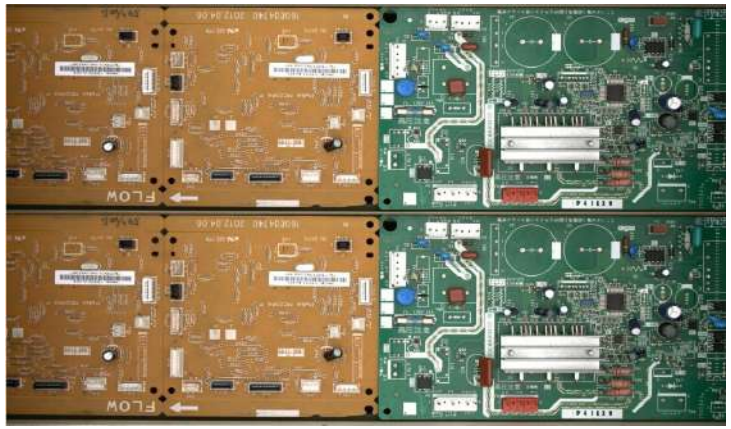
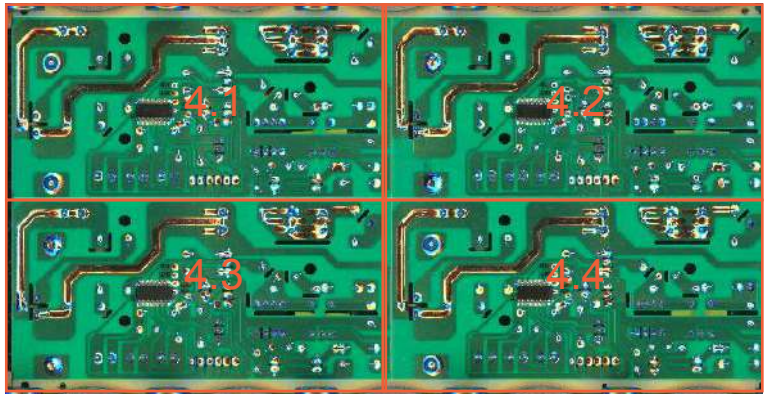
Various modes can be setup to support different application, such as alternative materials, post-wave mode use, etc., which is more practical.



Mixed board Inspection



Multi-panel Inspection

Option：Repair Station Help Quickly Locate the NG Position and Improve the Maintenance Efficiency

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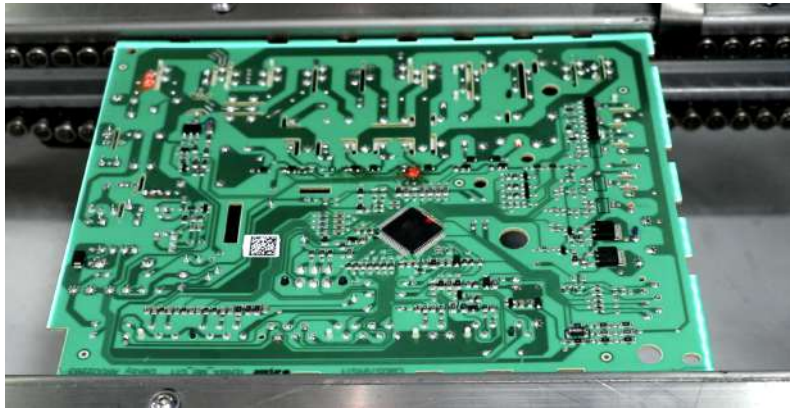
It can be used with post-wave AOI to assist production line workers in board repair and improve work efficiency.

- There is **Offline or Inline** to support multi-station operation. Flexible and efficient
- Support whole board/divided area, single point/multi-point and **different size cursor projection ways**
- Support **color setting**. Be able to adapt to various PCB board background with different colors



Customer Case: ： YG Power Co., Ltd.

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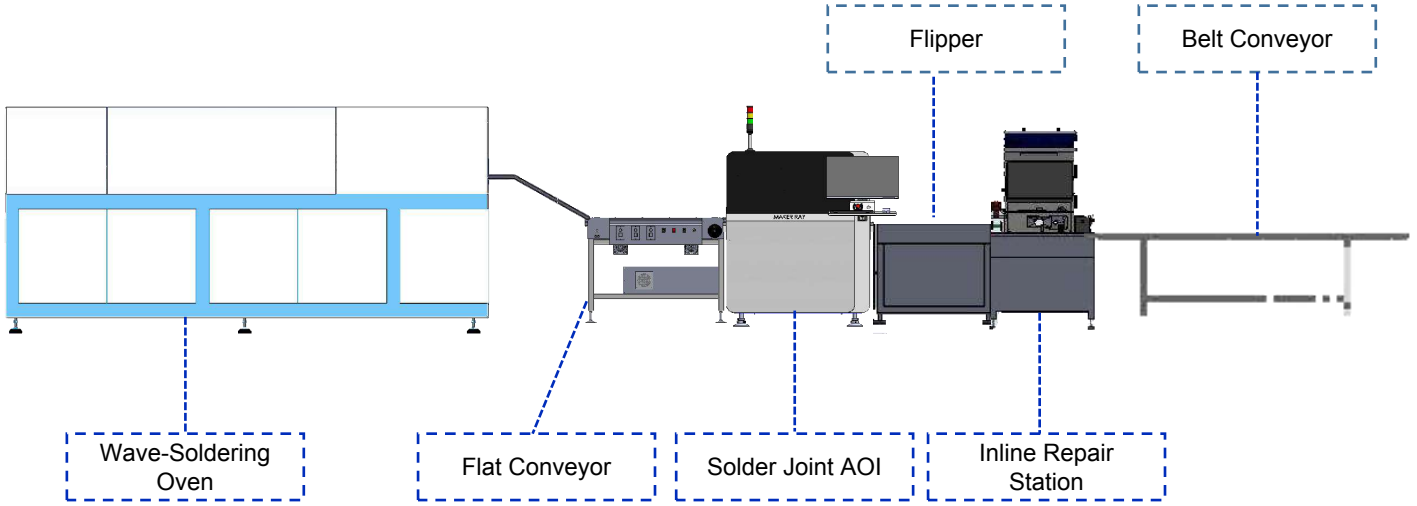
Problem： Small Solder joints with various status. Need long programming time by conventional AOI and prone to **missed inspection and false call**. Manual re-inspection is labor-intensive and costly. In addition, NG products will have a negative impact on the quality of the company's products.

Solution： Install AIS30X post-wave， collocated with inline repair station to ensure the NG can be repaired timely in this section to avoid it follow to next section, thus **improve the production efficiency and quality**.



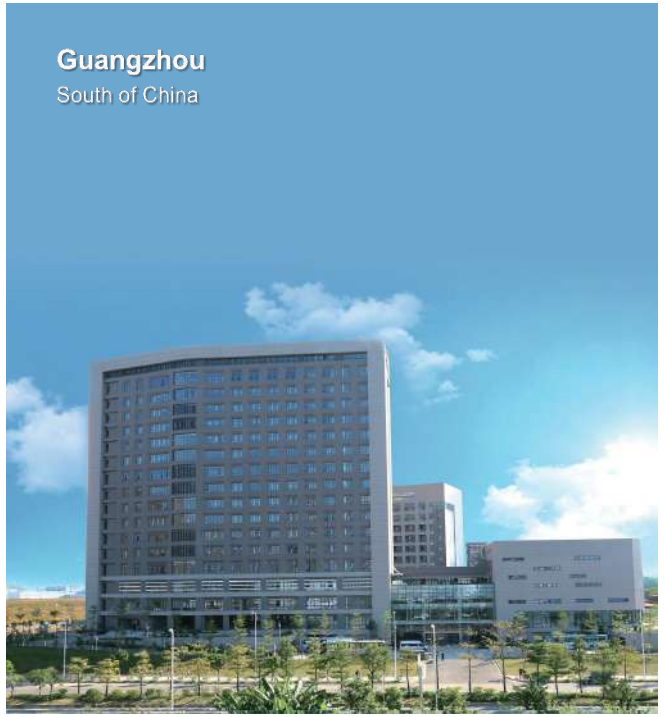
MAKΣR-RAY

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

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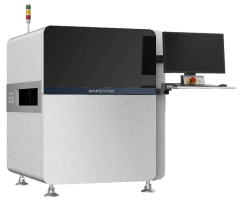
Dual in-line Package Inspection（THT）

Pre-Wave AOI



Post- Wave AOI

Double Sided AOI

Inline Repair Station

Surface Mount Inspection（SMT）

2DAOI

3DAOI

3DSPI

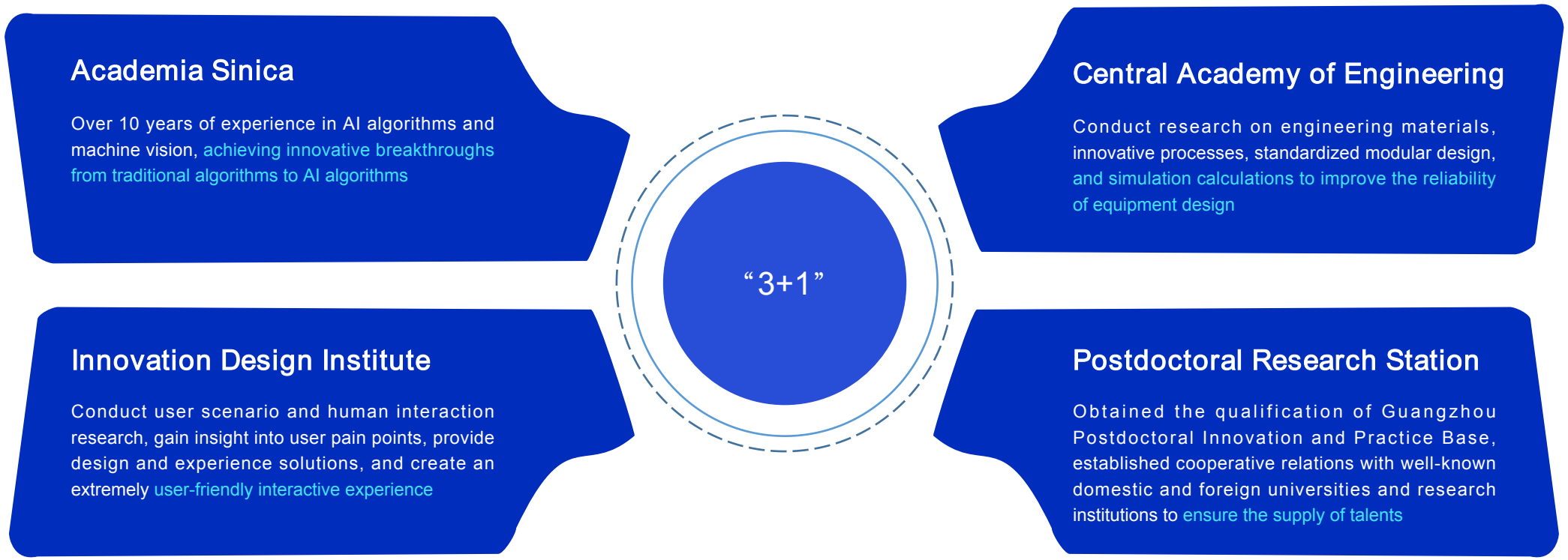
Surface Coating Inspection（Coating）

Single Sided CCI

Double Sided CCI

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

MAKER-RAY



Growth Curve

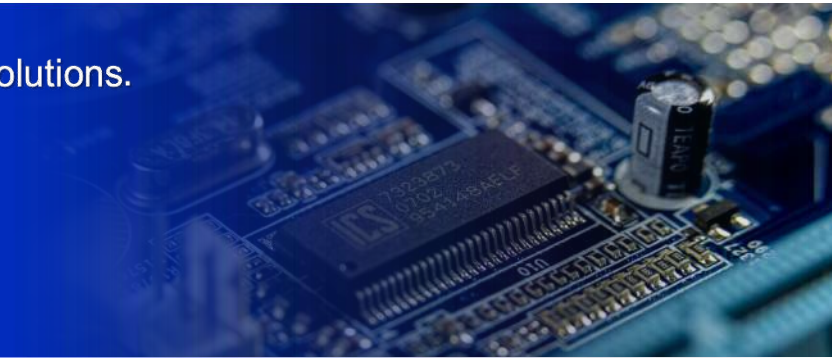
MAKER-RAY

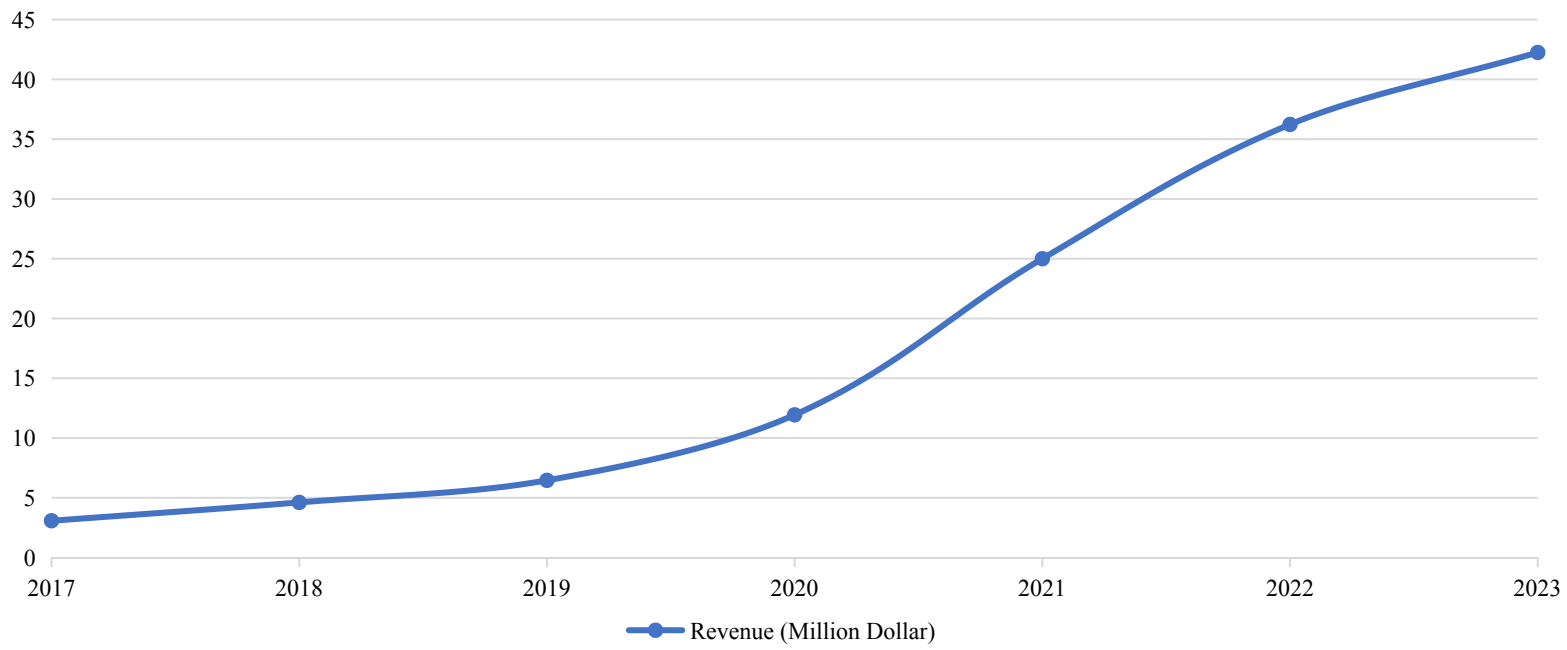
Drives innovation with technology to provide companies with competitive optical inspection solutions.

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**.

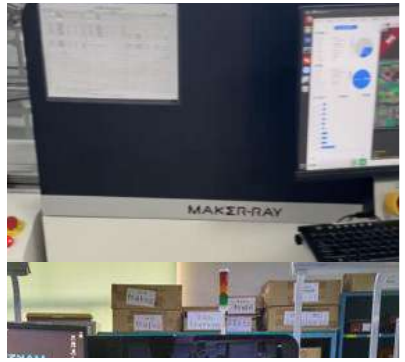
Marketed at Home and Abroad Used by Thousands of Factories

MAKΣR-RAY







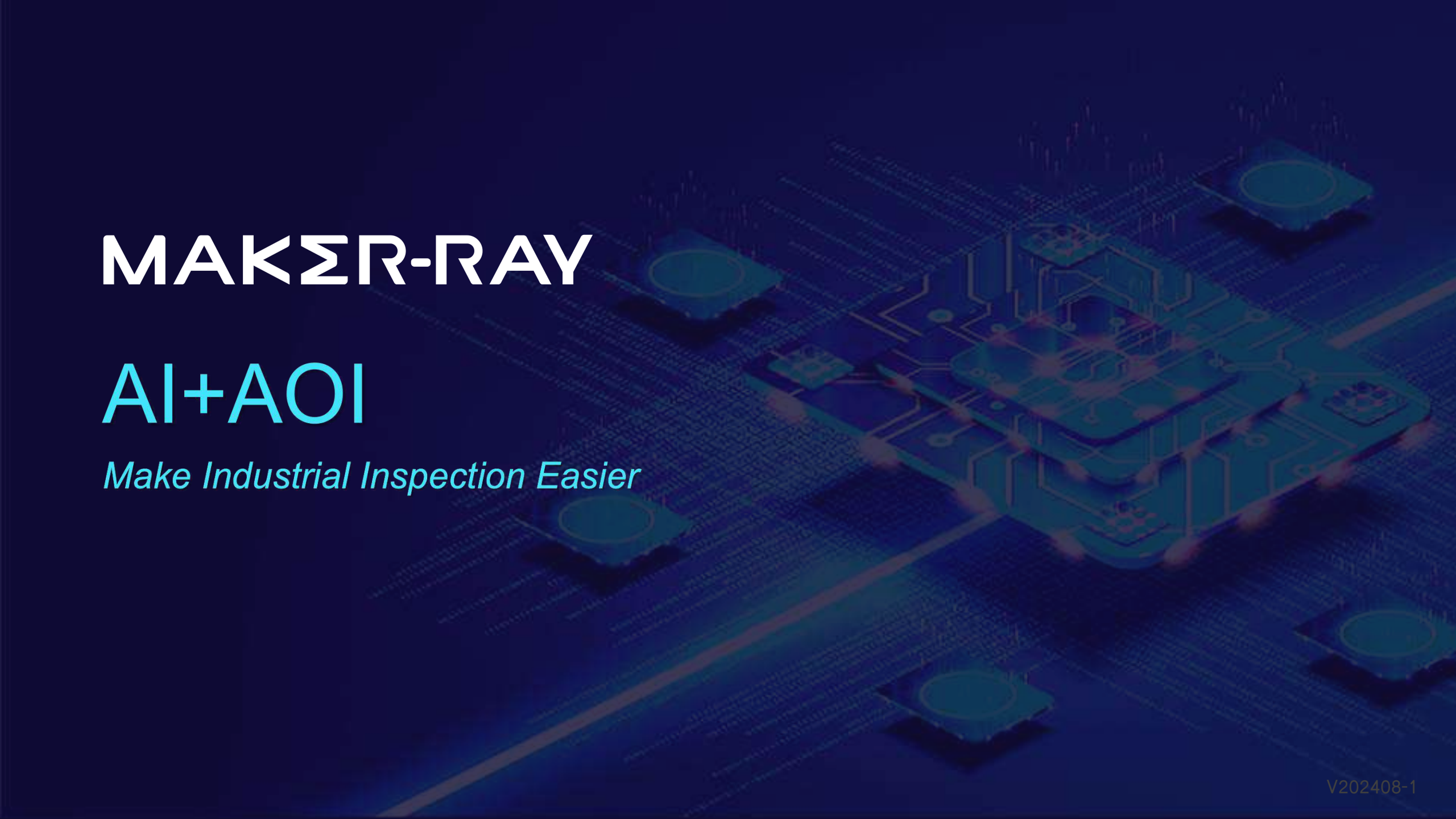




MAKER-RAY Trusted by Them

MAKER-RAY

Home Appliance	FOTILE 方太	Midea	CHANGHONG 长虹	Haier 海尔	HMD	Panasonic 松下电器	SKYWORTH 创维
Consumer Electronic	SUNWODA 欣旺达	MiTAC	RAMAXEL 冠唯芯	HKC 惠科股份	HEG 海格科技	Simand 新安电器	ASUS
Security and Defense Communication	FiberHome	alhua TECHNOLOGY	HIKVISION	FLY	Phenix 凤凰	CTI 华测检测	PYW
Power Supply	林洋能源	Huntkey 航嘉	MW MEAN WELL 明纬电源	GOSUPER 高斯宝	台达 DELTA	EAGLERISE 伊戈尔电气股份有限公司	迈思普电子有限公司
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	颐顿 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 云通科技	C&D
EMS	伟创力集团 FLEXTRONICS	安费诺 ANFEINUO	LuXshare 立訊精密工業	英業達 Inventec	wistron 緯創資通	深科技 KAIFA	……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AI+AOI
Make Industrial Inspection Easier
V202408-1