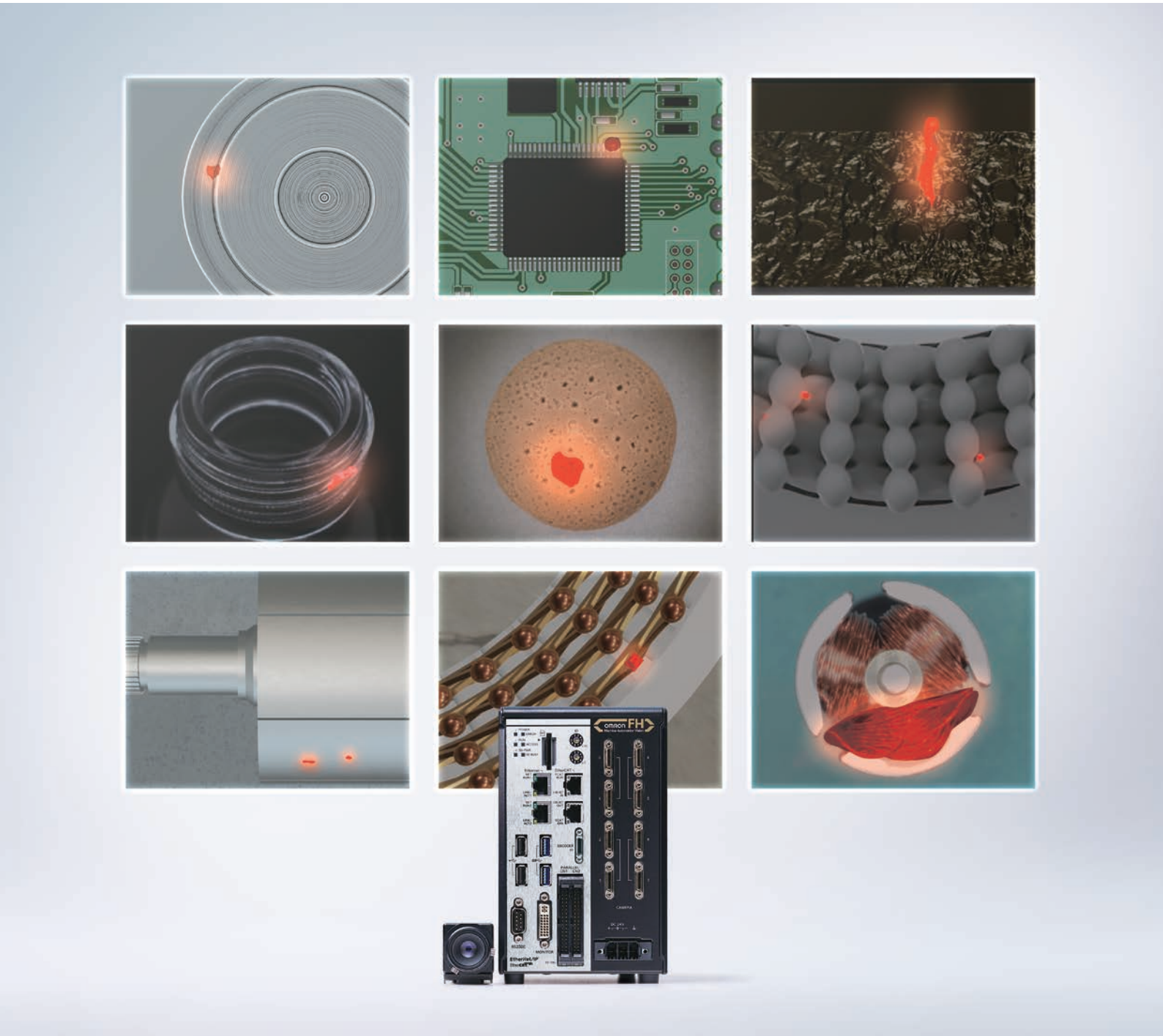
Vision System FH Series
AI Defect Inspection

OMRON

New AI feature makes the toughest defect inspection effortless for everyone



Have you ever tried implementing AI to automate your visual inspections, only to regret it afterwards?

We implemented AI, and

ended up with more overdetection than with visual inspections...

We can’t figure out the optimal settings, and

we’re just creating and evaluating AI models over and over again...

Custom-built for AI implementation,

hardware and software are difficult to maintain long term...

OMRON delivers AI that lets you easily conduct advanced inspections — with no special skills and no regrets!

Solve the three main causes of overdetection

New AI defect detection algorithm >P.4

Build the optimal AI model with a single click

New self-learning AI >P.6

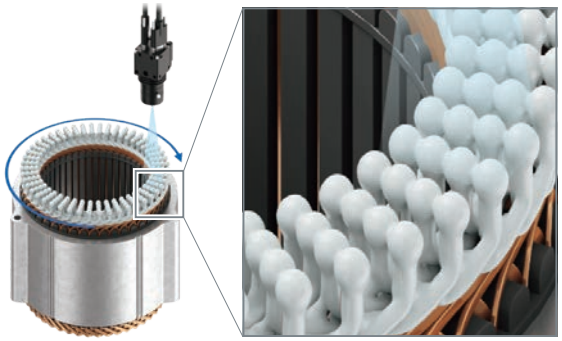
Save maintenance effort with all-in-one solution

Implement AI with the tried-and-trusted FH Series >P.8

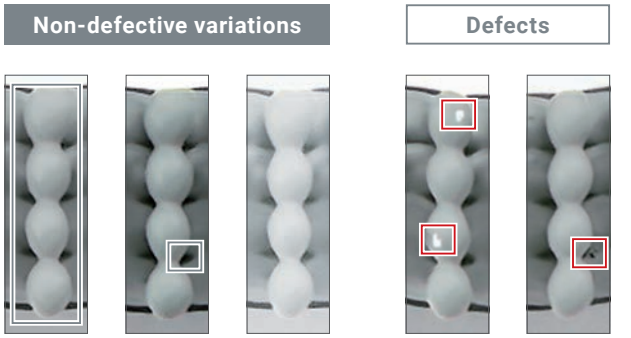
Solve the three main causes of overdetection
New AI defect detection algorithm

Extracting just the defects is difficult

1 Shape/color variation



Inspection of stator powder coating



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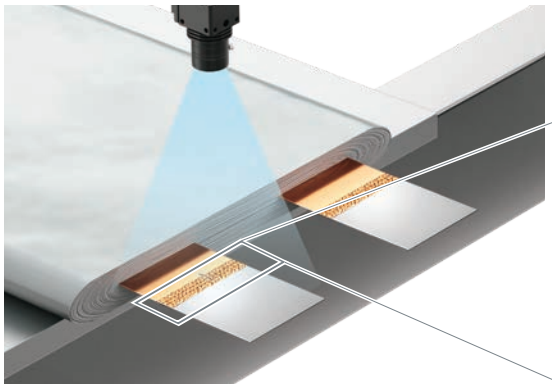
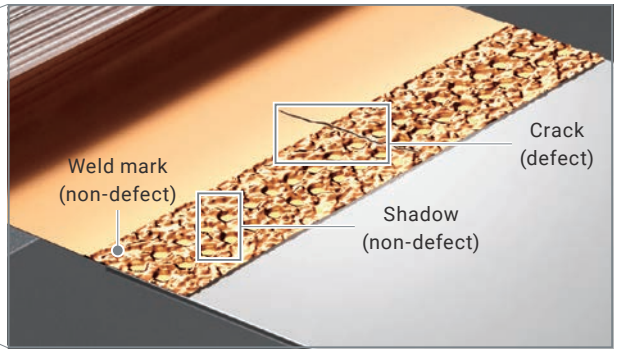
2 Complex background



Inspection of laminated battery tab welding

Goal: Judge products with weld marks as “non-defective” and only those with cracks as “defective”



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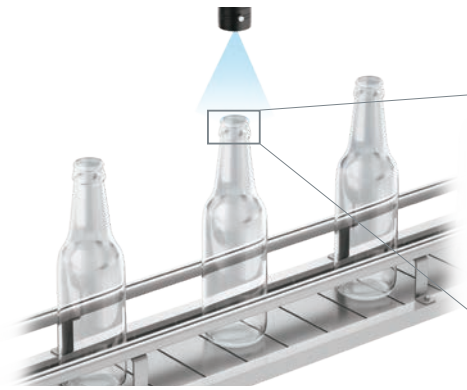
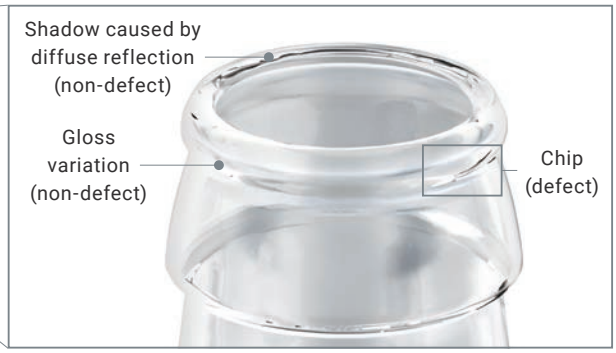
3 Gloss variations



Inspection for chips on glass bottle finishes

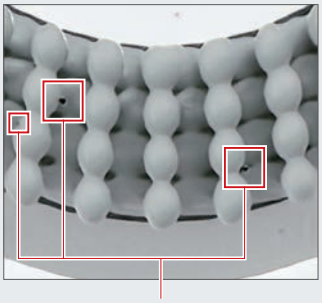
Goal: Judge products with gloss variation as “non-defective” and only those that are chipped as “defective”



Stably detects just the defects to significantly reduce overdetection

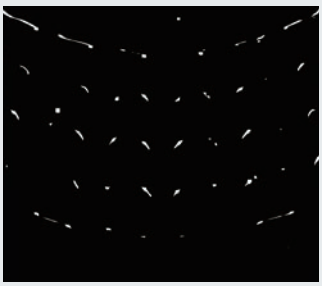
1 Variations in shape or color are ignored, and only blemishes and dirt are detected

Input image



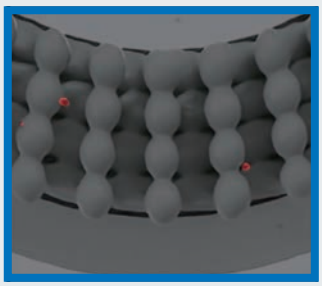
Contamination

Previous methods



Overdetection of shape/color variations

AI Defect Inspection

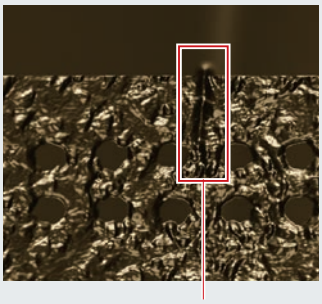


Only contamination is detected

See video demonstrating stable detection, even with shape/color variations

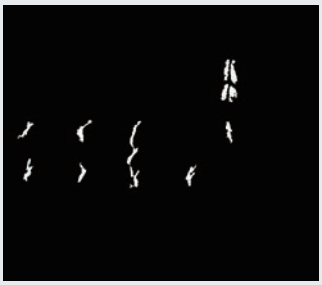
2 Weld marks are ignored, and only cracks are detected

Input image



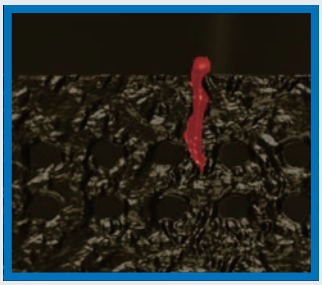
Crack (defect)

Previous methods



Overdetection of weld marks and shadows

AI Defect Inspection



Only cracks are detected

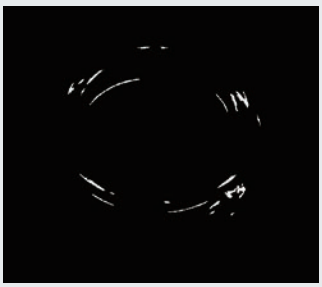
See video demonstrating stable detection, even with complex background

3 Gloss variations are ignored, and only chips are detected

Input image

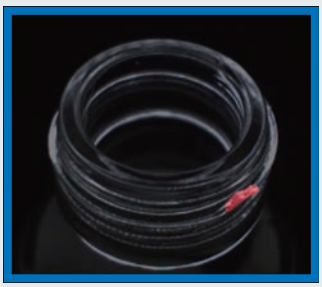
Chip (defect)

Previous methods



Overdetection of gloss variations

AI Defect Inspection



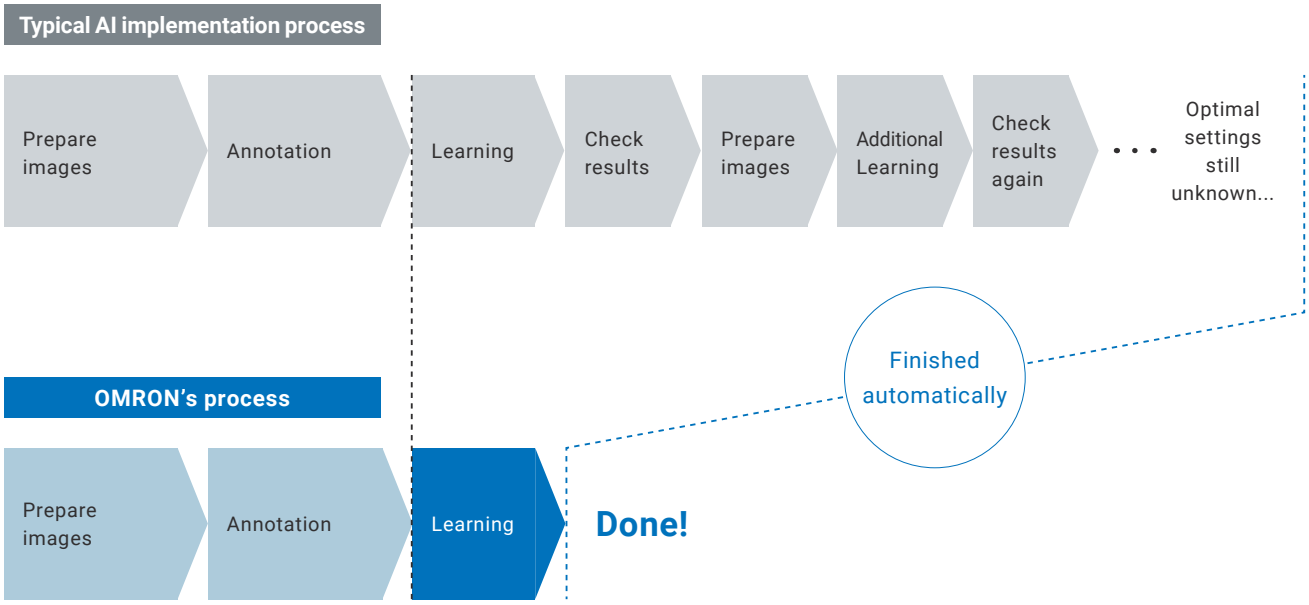
Only chips are detected

See video demonstrating stable detection, even with gloss variation

Build the optimal AI model with a single click New self-learning AI

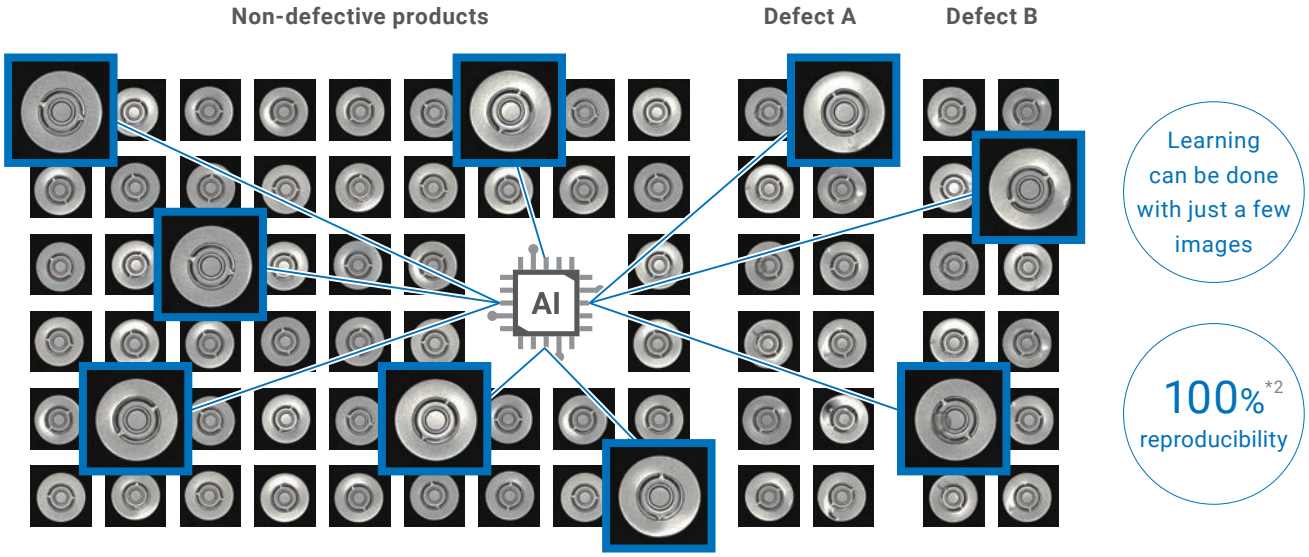
Automates model building, a bottleneck in AI implementation

Our new self-learning AI automatically executes the repetitive task of learning and result-checking necessary for developing AI detection performance. The system selects the best images for learning, so anyone can build the optimal AI model—no expert knowledge required. This dramatically saves time, not only for initial configuration but also when creating an AI model every time a new product is added.



Auto-adjusts to eliminate overdetection*1

Our new self-learning AI eliminates overdetection by automatically selecting and learning the optimal images. Trials can be started in no time, even with a limited number of sample images. Furthermore, by using the same sample images, you can achieve the same learning results, ensuring reproducibility for reliable use in manufacturing sites.



*1. Detection rate is for all sample images stored for preliminary learning.
*2. Always the same results for the same dataset

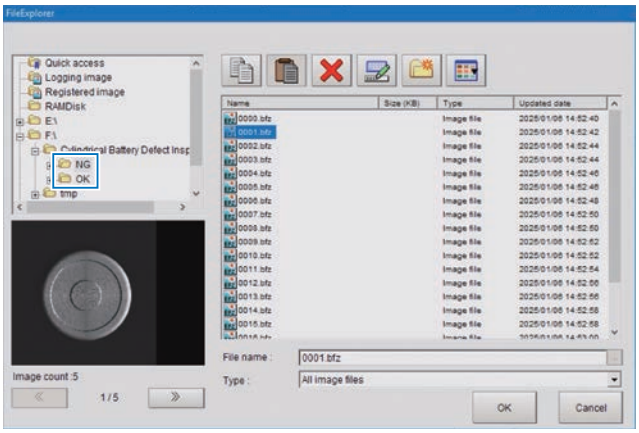
See video demonstration of easy configuration

Configuration can be completed in 3 steps

STEP 1

Prepare images

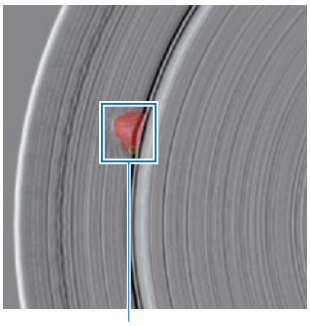
Prepare your images, separated into “non-defective” and “defective” products.



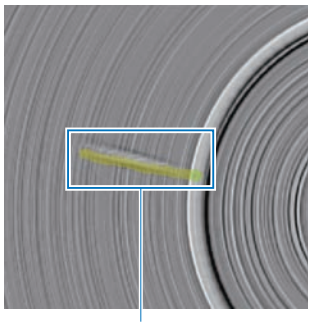
STEP 2

Annotation

Mark the defects, as if you were pointing them out to another person.



Dent is marked



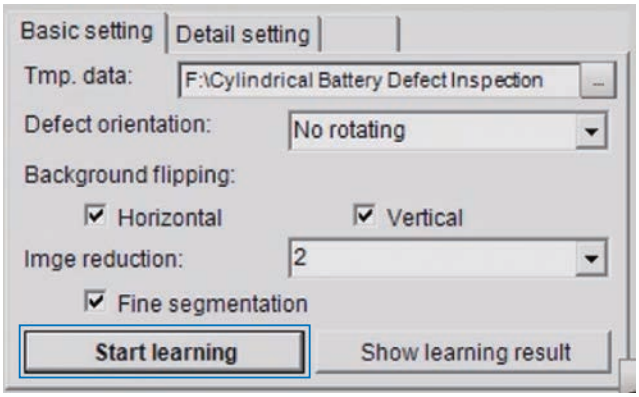
Scratch is marked

STEP 3

Learning

Simply click the [Start learning] button to run self-learning. Configuration will be completed in a matter of minutes.*3

*3. The setting time varies depending on the conditions of the learning process.



Done!

Save maintenance effort with all-in-one solution
Implement AI with the tried-and-trusted FH Series

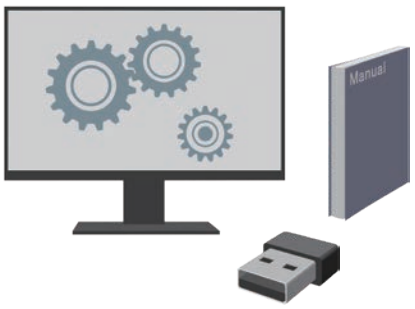
Simple system configuration perfect for manufacturing sites

You can use the AI Defect Inspection feature just by adding its license to your FH Controller.
This allows you to avoid the common irony of AI tool implementation hiking up maintenance costs for image inspection devices.

Typical AI tools

- The vast number of possible hardware combinations makes selection and assessment difficult
- Hard to set up component plan with industry-level long-term guarantee

- Tool just for AI, which means having to learn all over again...
- Software is subscription license, and must be budgeted for every year



FH Series

- All-in-one vision controller
- Stable, long-term offering, complete with support in the event of failure

Tried-and-tested FH Series

FH Vision Sensor Controller
FH-5552-□□*1

- AI added to vision system you're familiar with
- No need for annual budgeting or contract renewals

Perpetual license

Licence for AI Defect Inspection
FH-UMLIC-08

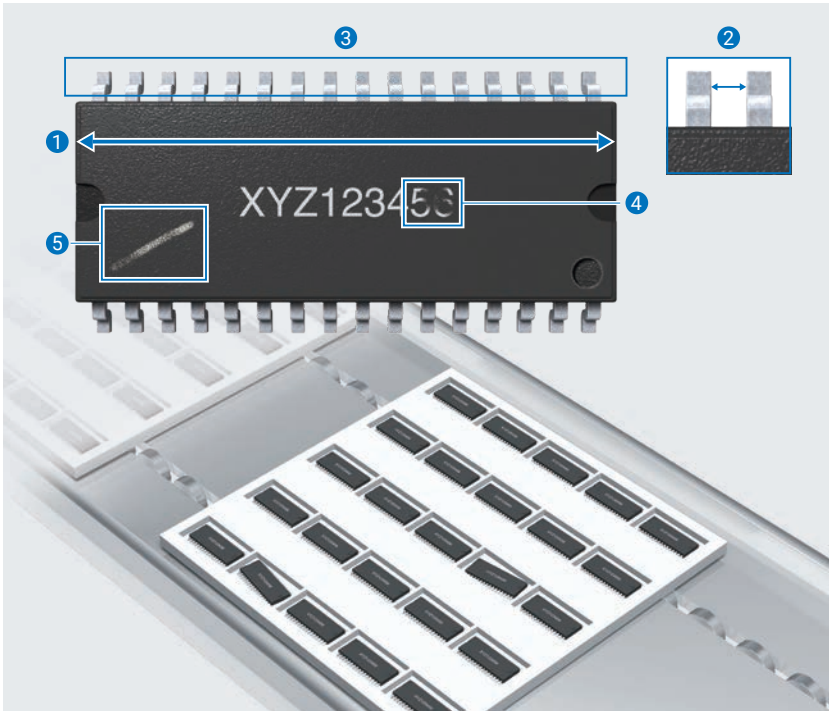
*1. Refer to our FH Series catalog (Cat. No. Q197) for details on the rated specifications and performance of the FH-5552 controller, and models, rated specifications, and performance of cameras and accessories.

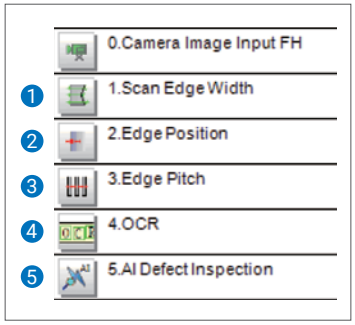
AI and rule-based processing can be included in same inspection flow

Flow chart UI enables flexible design

AI processing can be easily added to your existing inspection flow, allowing you to make effective use of your assets.

Example: Appearance inspection of IC chip

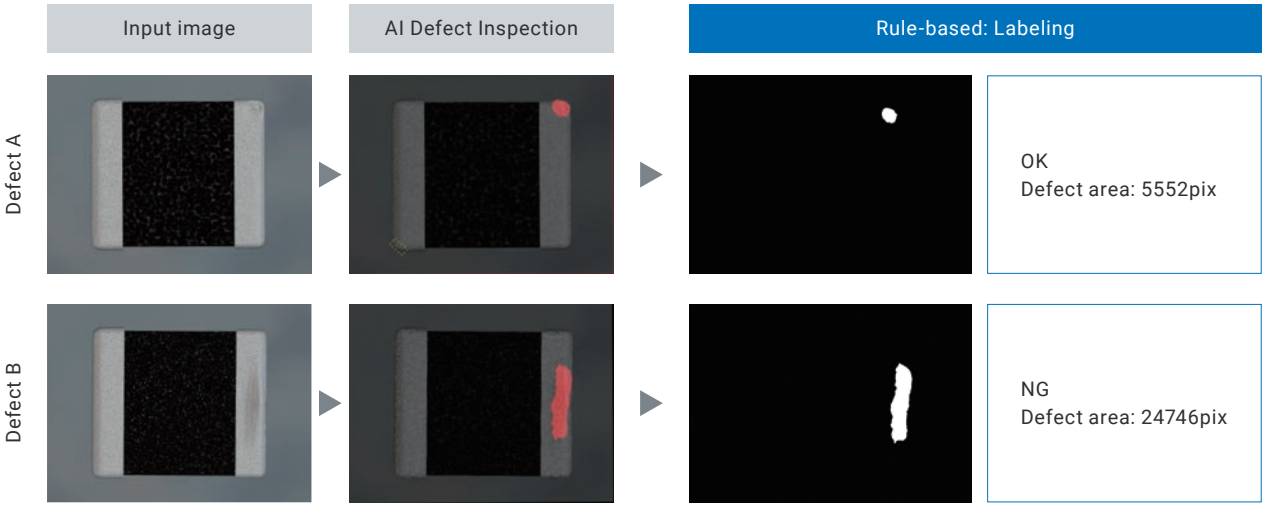




Inspection flow

Enables quantitative judgment in AI inspection

Quantitatively accounting for AI inspection results can be difficult. This new function enables you to quantify the defects by incorporating rule-based inspections, allowing for easily explainable judgments.



AI extracts defective portion

Area of extracted defect is measured for quantitative judgment

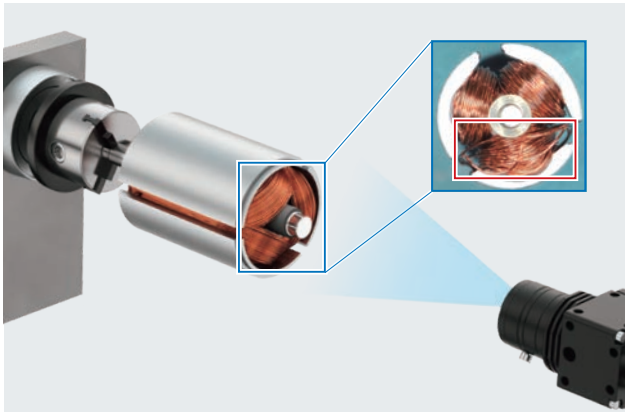
AI Defect Inspection Solutions

With AI Defect Inspection, stable detection can be achieved with simple training for cases that conventional image processing has struggled to distinguish between non-defective and defective products, leading to over-detection.

Automotive Parts

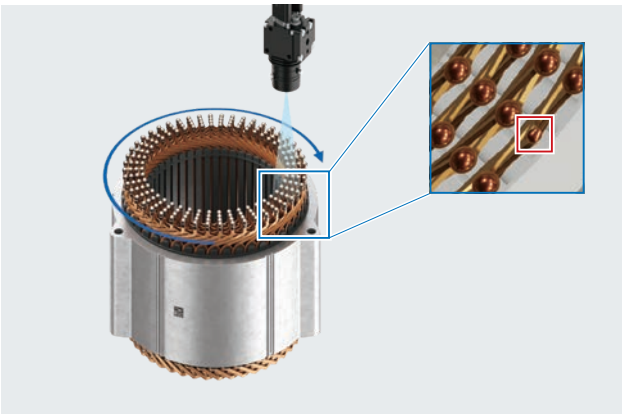
Inspection for coil winding defects

Shape/color variation
Gloss variations



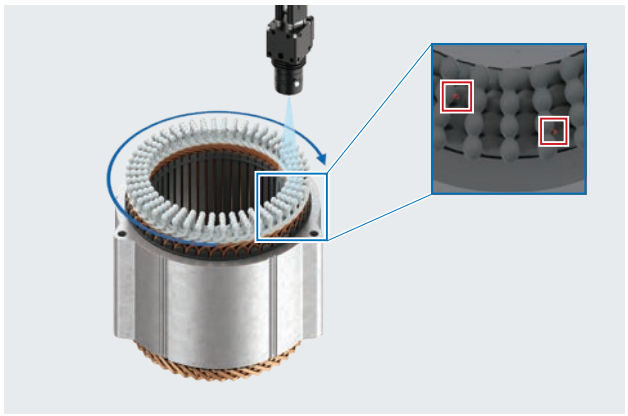
Inspection for welding spatter on stators

Shape/color variation
Gloss variations



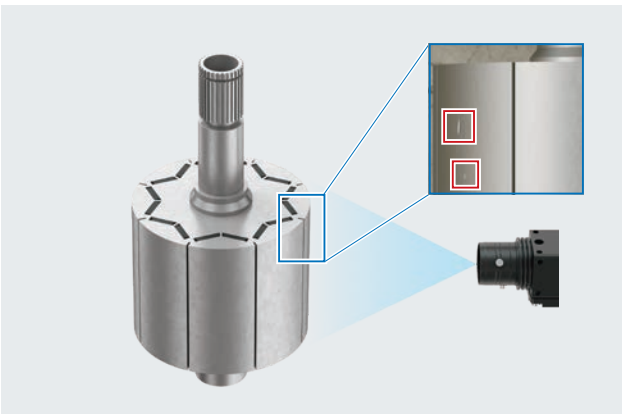
Inspection of stator powder coating

Shape/color variation



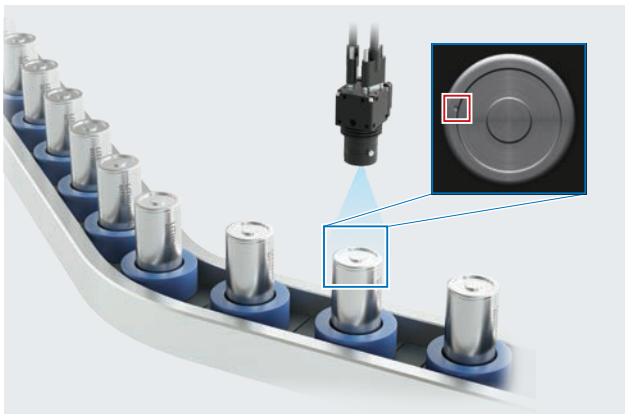
Inspection for scratches on motor cores

Complex background



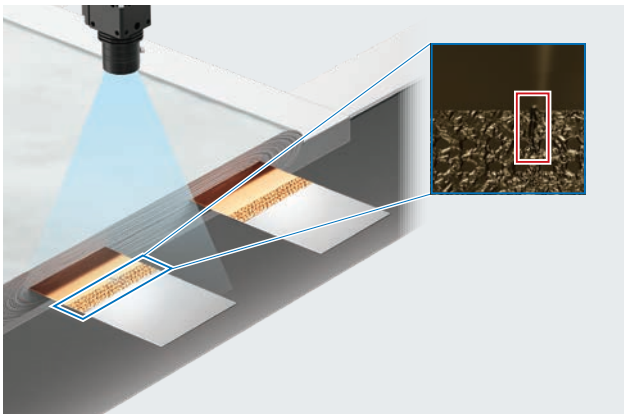
Inspection for scratches/dents on cylindrical batteries

Shape/color variation



Inspection of laminated battery tab welding

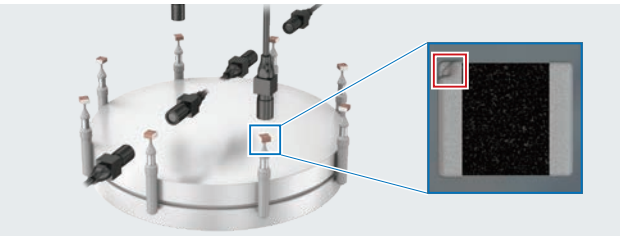
Shape/color variation
Complex background



Electronic Components

Inspection for scratches/dents on condensers

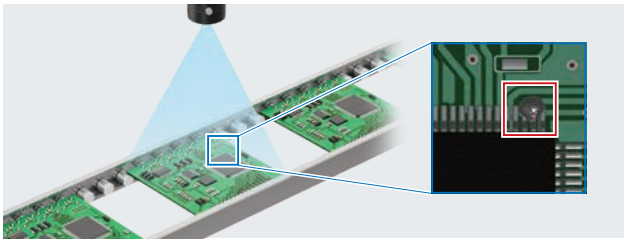
Complex background



Inspection for solder splatter on PCBs

Complex background

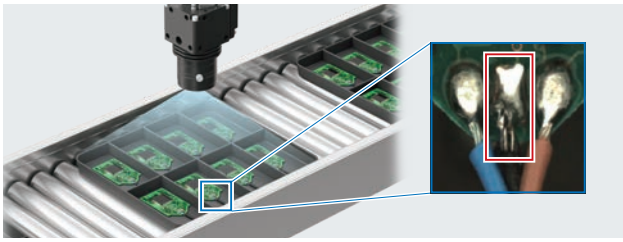
Gloss variations



Inspection for soldering defects

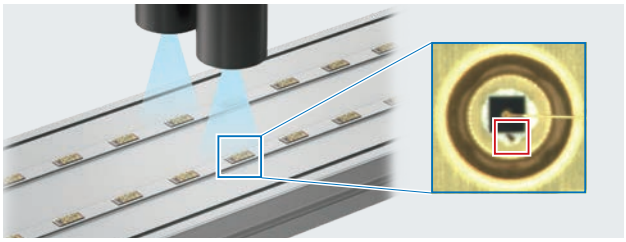
Shape/color variation

Gloss variations



Inspection for contaminants after wire bonding

Shape/color variation

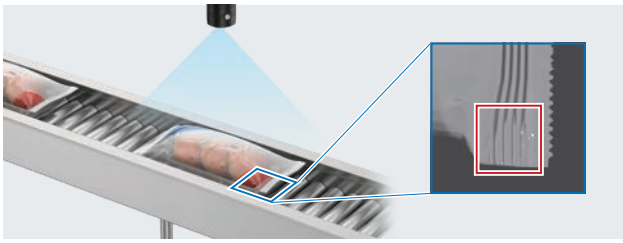


Foods/Pharmaceuticals

Inspection for package sealing defects

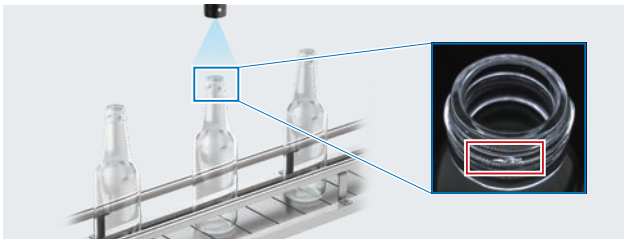
Shape/color variation

Complex background



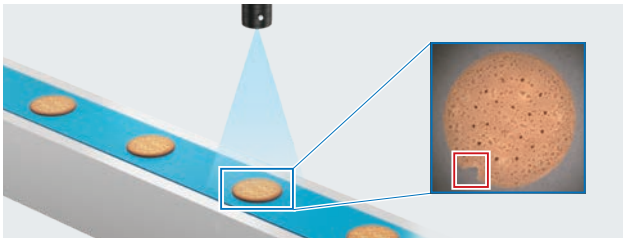
Inspection for chips on glass bottle finishes

Gloss variations



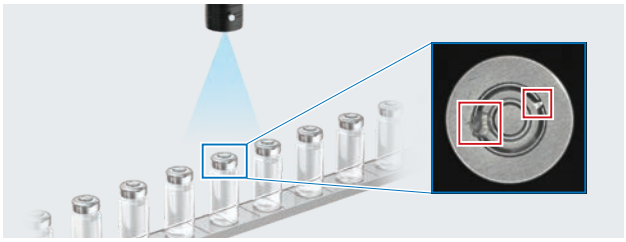
Inspection for burns/chips on biscuits

Shape/color variation



Inspection for scratches on vial caps

Shape/color variation



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