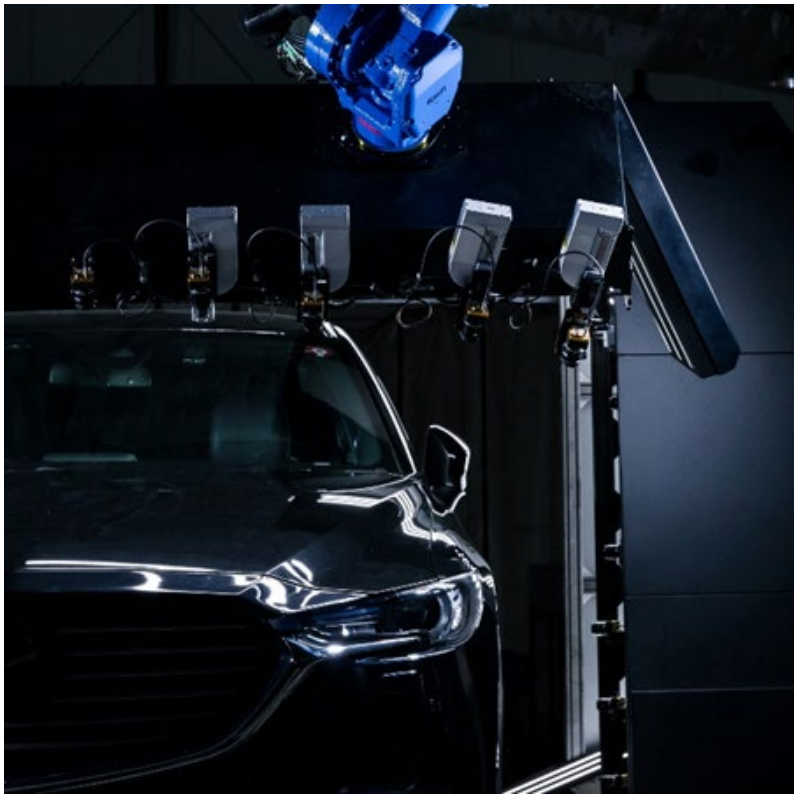
Automation focused RICOH Visual Inspection System 5000 rewrites improved production quality with high accuracy for vehicle paint inspections

Tokyo, December 19, 2023 – Ricoh Elemex Corporation (President & CEO: Yasutomo Mori), a subsidiary of Ricoh Company, Ltd. (President and CEO: Akira Oyama), today announced the launch of the RICOH Visual Inspection System 5000 series of vehicle paint inspection systems on December 19.

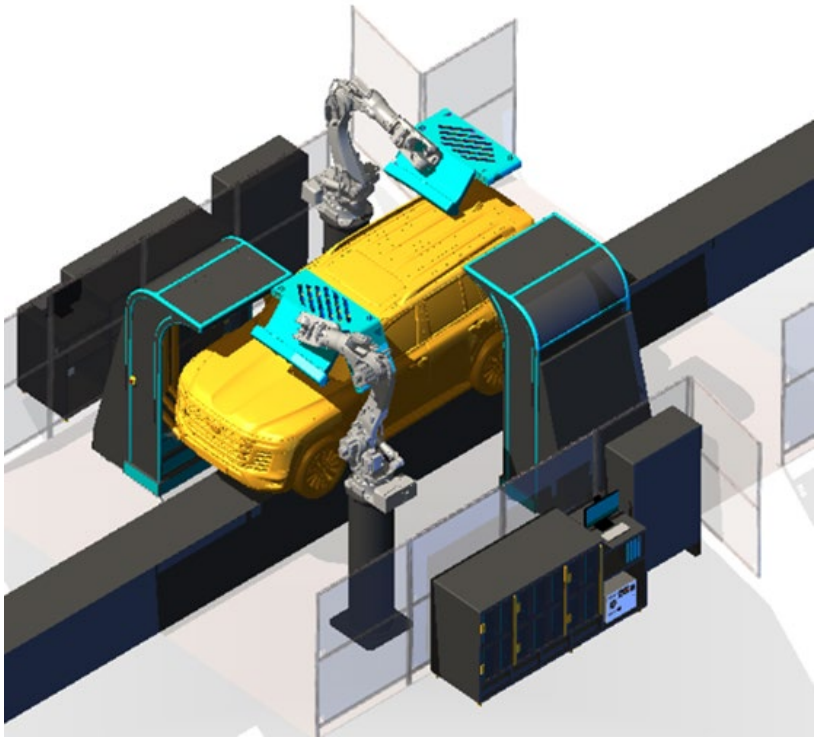
Combining Ricoh Elemex's many years of experience in inspecting painted products and its proprietary image recognition technology, this inspection system automates the visual inspection of automotive coatings, which was previously done visually, while maintaining high accuracy and without stopping the production line. The hybrid configuration of the fixed type on the side and the robot type on the top surface realizes the optimal placement of the camera and lighting, which stabilizes the image and enables highly accurate inspection. In addition, since various data such as the number of defects can be automatically recorded through automation, it can be expected to improve productivity not only by improving defects but also by analyzing data that can improve the source of the production line.

Ricoh Elemex has been developing coating appearance inspection systems for more than ten years and has introduced them to many mass production lines for automotive parts. We have further developed this technology and launched the RICOH Visual Inspection System 5000 series of coating visual inspection systems for automobile bodies. By improving inspection accuracy and productivity, we are contributing to the DX (digital transformation) of our customers' sites in the automotive industry.

* This product will be offered in the Japan and China markets. Other regions will be considered in the future.



<RICOH Visual Inspection System 5000 Series >



< Inspection image of RICOH Visual Inspection System 5000 Series >

Background

With the advancement of automation in automotive production lines, visual inspection of vehicle paint is still an area that requires a lot of manpower and man-hours. In addition, human visual inspections are prone to (1) variations in inspector skill and (2) inadvertent changes in standards due to the passage of time and fatigue, which is an issue.

Key features of the RICOH Visual Inspection System 5000 Series

1. High inspection accuracy

- Based on many years of experience in inspecting painted parts, we have accumulated a large amount of inspection data and defective sample data (surface angle, strain, reflectance) in a database. Utilizing this data, we have adopted an algorithm that combines rule-based defect detection and AI (machine learning) to determine defect types. It eliminates the need to accumulate a large amount of training data, avoids detection errors that cannot be analyzed, and uses AI to identify defective species with high accuracy.
- The hybrid configuration, which uses a fixed type on the side view with little undulation and a robot type on the upper view with a large height difference, can achieve optimal placement of cameras and lighting, and can perform imaging and inspection while following the shape, enabling efficient and high-precision inspection over a wide inspection area.
- By analyzing various data recorded automatically such as the number of defects, production line process with defects can be improved and increase productivity.

2. Adaptable to high-speed conveyors

- With a standard speed of 170 mm/sec (42 s/unit, 85 units/h), it is also adaptable to high-speed production line speeds. *1

*1 In the case of a 7m pitch (5m for vehicles + 2m for spacing)

3. Mass production start-up in a short period

- Unlike AI-based algorithms that require a large volume of image data when changing or adding a vehicle model to the production line, making adjustments using only small amounts of data is possible, reducing the launch and introduce period significantly.
- Customers can easily adjust the level of detection using carefully selected rule-based parameters.

- As a hybrid design, it is possible to respond over a short period without adding hardware, just training the robot when adding a car model.

4. Partially installable

- Since the fixed a type side unit and the robotic top unit are separated, individual units can be introduced on a trial basis. Proceeding with full-scale introduction after confirming the performance on the mass production line with only one unit is possible.

5. Non-contact marking (* option)

- The option to project defective location directly onto the vehicle reduces the load on workers and improves inspection quality. It is easy to search for defective parts on the vehicle, and it is expected to improve inspection quality by reducing work time, load, and fatigue.

Main Specifications of the RICOH Visual Inspection System 5000 Series

Item		specification
Inspection target Processes and vehicle types	Processes to be introduced	Post-painting process in-line inspection (during conveyor transport)
	Installation space (Reference value)	L:4700mm W:4700mm H:3900mm *Assuming a conveyor width of 2700mm. Varies depending on the customer's production line
	Compatible vehicle sizes	Assuming a mini car ~ minivan size vehicle * Consultation required for size details
	Estimated vehicle spacing	2m
	Objects to be inspected	Painted body
Inspection Performance	Defect location indication	Mapping the location of defects in vehicle development drawings

	Inspection range	Both sides, top surface (roof, bonnet), rear surface (optional) * Excluding the end of the character line
	Inspection method	Continuous angle of view imaging method
	Paint condition	Clear paint, medium coat coating * Gloss level 80 or more
	Vehicle speed ・Inspection tact	Max. 170mm/sec (42 s/car, 85 units/h) *In the case of a 7m pitch (5m for vehicles + 2m for spacing)
	Detection defect size	0.5 mm or more (NG judgment), 0.3 mm or more (Detection)
	Detection result output	Defect presence, defect location, defect size, time of occurrence, defect type determination result
Hardware Utilities	Main equipment configuration	Side Inspection Unit 1 & 2, Top Inspection Unit 1 & 2 Control Unit, Rear Inspection Unit (Optional) Non-contact marking (optional)
	Capture of vehicle type information	Assuming RFID Switching time: 6 seconds or less * RFID is arranged by the customer
	Power Specifications	3 phases 380V±10%・50Hz / Single phase 220V±10%・50Hz
	Safety Specifications	Equivalent to safety category 3 * Consultation required for safety fence arrangement
	Maintenance and Maintenance Specifications	Equipped with a function that allows you to remotely monitor equipment status and solve problems

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Ricoh is a leading provider of integrated digital services and print and imaging solutions designed to support digital transformation of workplaces, workspaces and optimize business performance.

Headquartered in Tokyo, Ricoh's global operation reaches customers in approximately 200 countries and regions, supported by cultivated knowledge, technologies, and organizational capabilities nurtured over its 85-year history. In the financial year ended March 2023, Ricoh Group had worldwide sales of 2,134 billion yen (approx. 16.0 billion USD).

It is Ricoh's mission and vision to empower individuals to find Fulfillment through Work by understanding and transforming how people work so we can unleash their potential and creativity to realize a sustainable future.

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