

FOR IMMEDIATE RELEASE

High-Speed Inline Inspection Enabled for Material Classification and Foreign Materials Detection Using Hyperspectral Cameras

High-Output LED Lighting for Hyperspectral Cameras to Classify Materials like Plastics is Available

Kyoto, Japan, March 31, 2025 – CCS Inc. (CCS) has developed high-output LED lightings for hyperspectral cameras,^{*1} expanding its product lineup.

Inspection LED lighting includes visible light such as red, blue, and green, as well as other lineups of ultraviolet and infrared wavelengths. While appropriate wavelengths are available according to the inspection object, the spectral distribution of each wavelength is narrow. Therefore, depending on the inspection objects, it will be necessary to use a light source that can illuminate a wide range of wavelengths and a hyperspectral camera to conduct the inspection.

In recent years, the market for inspections utilizing hyperspectral imaging^{*2} has expanded^{*3} in various fields, increasing the demand for hyperspectral cameras and the corresponding light sources.

For example, when recycling plastics, the quality of the recycled product is degraded if various types of plastics are mixed together. Therefore, material classification is required. However, when the colors are the same, it is difficult to classify plastics visually or with a visible light camera. In such cases, hyperspectral cameras enable highly accurate identification because each plastic material has its own reflective properties at different wavelengths.

Traditionally, halogen lamps, which can emit a wide range of wavelengths from visible light to infrared, have been used as the light source for hyperspectral imaging inspections.

However, there are several disadvantages:

- Due to environmental concerns, many halogen lamp manufacturers have ceased production.
- Because of the lamp's limited lifespan, regular replacement is required, leading to high maintenance costs^{*4}.
- Since halogen lamps emit heat radiation, there is a risk of deformation or melting of the inspected objects due to the heat.

LED lighting for hyperspectral cameras is attracting attention as an alternative light source that can solve these problems because it has a longer life than halogen lamps, does not contain heat radiation, and can irradiate a wide range of wavelengths.

CCS developed LED lighting for hyperspectral cameras in 2023 and has been proposing them to customers.

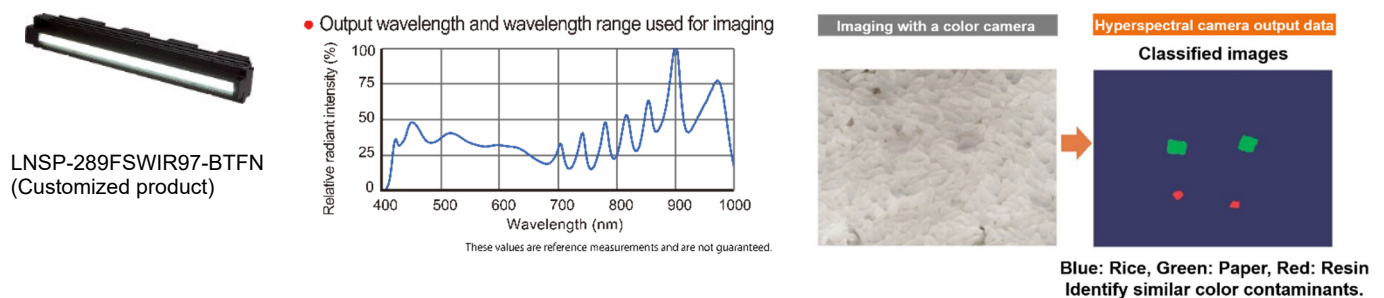
Conventional products had insufficient light output when used in inline inspections^{*5} with high conveyor speeds, resulting in darkened images. To resolve this problem, CCS developed high-output LED lightings for hyperspectral cameras that can provide sufficient light even for high-speed inline inspections.

■ New Product Lineup

Visible light type (400 to 1000 nm)

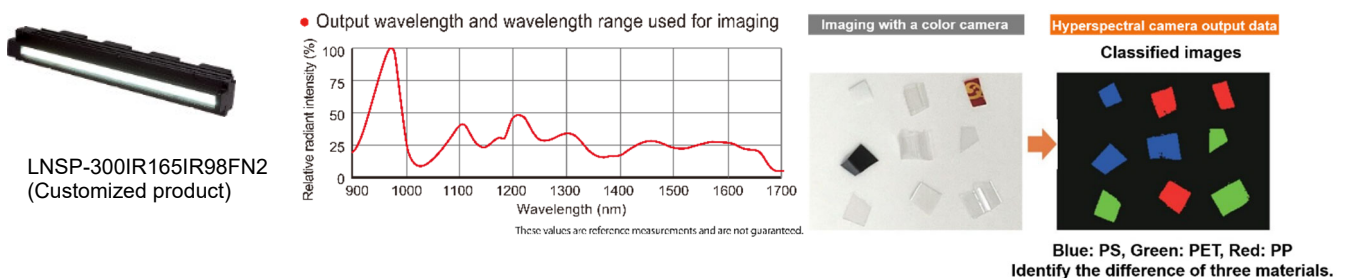
For example, when inspecting foreign materials in white rice, it is difficult to distinguish the color difference between white rice and foreign materials in images captured by conventional lighting and cameras.

Therefore, by acquiring wavelength data of reflected light using a hyperspectral camera while irradiating visible light, the different reflected spectra of each color are analyzed for classification processing to clarify subtle color differences and detect foreign materials.



Near-infrared type (900 to 1700 nm)

The near-infrared type is effective for inspecting objects that are difficult to distinguish with visible light. For example, when inspecting the material differences of plastics such as ABS resin or PP resin, it is challenging to distinguish them visually. On the other hand, by irradiating a wide range of infrared wavelengths and acquiring spectral data of reflected light using a hyperspectral camera, it is possible to analyze the differences in materials with different reflection spectra, perform image processing, and classify each material.



■ About Customization

CCS provides custom solutions for a wide range of inspection needs. Beyond the standard product lineup, CCS can tailor the lighting wavelengths to customer's exact requirements, including fine-tuning specific wavelength ranges. The form factor is also highly flexible; it is

not limited to line-sensor configurations and can be adapted to coaxial or other shapes, as well as adjusted in size to meet the requirements of customer applications.

With the development of this product, CCS will further expand its range of proposals using hyperspectral imaging. By proposing new lighting solutions, CCS will continue to resolve customers' problems, evolving into an "indispensable lighting solution vendor" for manufacturers worldwide.

*1 A camera capable of acquiring wavelength information of an object to be imaged. There are two types of cameras, one sensitive mainly to visible light and the other to infrared light.

*2 Technology that uses a hyperspectral camera capable of acquiring images with high wavelength resolution and corresponding illumination to acquire images. By capturing and visualizing the reflected light of an object, it can perform inspections that are difficult to achieve with conventional cameras, such as component analysis, foreign material detection, and high-precision color identification. It is expected to develop in various industrial fields in the future.

*3 Source: Global Information, Inc., "Hyperspectral Imaging Systems Market Size Forecast to Reach US\$35.8 Billion by 2026."
<https://prtimes.jp/main/html/rd/p/000002199.000071640.html>

*4 Based on maintenance cost comparison data between CCS halogen lighting and LED lighting calculated by CCS.

*5 A method of incorporating visual inspection into the production line to inspect products in real time.

■ About CCS Hyperspectral Imaging

CCS hyperspectral imaging can be applied in semiconductor and battery inspections, genetic research, waste sorting, recycling, agriculture, food and feed quality inspections, and moisture content testing.

This new product achieves the same or higher output than conventional halogen lighting. Furthermore, the product lineup consists of two types: a visible light type and a near-infrared type. It can be utilized for various inspections by selecting the appropriate type based on the wavelength range required for imaging with a hyperspectral camera.

■ About CCS Inc.

Since 1993, CCS has advanced the machine vision industry by developing LED lighting for inspection that creates customer satisfaction for both manufacturers and their consumers, who demanded safe, high-quality products. Today, CCS leads the machine vision world in innovation with thousands of products including lights, controllers, and accessories. CCS's global network of employees is dedicated to helping manufacturers capture the most important details in an inspection so their customers never receive anything less than their highest quality.

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