# New high-efficiency SWIR illumination for hyperspectral imaging

Reliable hyperspectral data in industrial inspection and sorting systems depends not only on sensor performance, but also on stable and spectrally suitable illumination conditions. Variations in intensity, shadowing or spectral mismatch can significantly affect measurement quality, particularly in dynamic, conveyor-based environments.

HAIP Solutions has introduced its new BlackBright Fast Medium Wave IR (FMWIR) illumination, developed to provide high-intensity and uniform illumination for hyperspectral imaging in the short-wave infrared (SWIR) range.

The system covers a spectral range from 900 to 1800 nm, with a peak intensity around 1600 nm. This targets wavelength regions that are particularly relevant for many material analysis tasks like polymer identification, where conventional halogen illumination systems often show limitations. As a result, material-specific spectral features can be captured more reliably across a wide range of industrial and research applications.

## Designed for stable and reproducible measurements

A central aspect of the system is its ability to deliver high spectral intensity in the relevant SWIR region, supporting consistent data acquisition even under challenging conditions.

To ensure uniform illumination, the system generates a defined line profile using a dual-stage reflector concept. This combines a ceramic-coated emitter with an external silver-coated reflector, concentrating the emitted radiation into the active measurement line. The resulting illumination profile offers high uniformity while reducing stray radiation and specular reflections.

These characteristics contribute to improved measurement stability and repeatability, particularly in high-throughput industrial processes.

## Efficient alternative to halogen

Compared to traditional halogen-based systems, which often require high energy input and generate significant heat, the BlackBright FMWIR operates at a reduced filament temperature of approximately 1600 K. This also enables a lifetime of up to 10 000 hours, while maintaining low heat emission and improved energy efficiency.

## Modular design for flexible integration

The illumination is designed for integration into industrial environments. A modular architecture allows configurable segments ranging from 250 mm up to 1000 mm per unit. Larger working widths can be achieved by combining multiple modules, enabling flexible adaptation to different system layouts.

An optional spectral bandpass filter allows application-specific optimisation by restricting emission to relevant wavelength ranges. This supports temperature-sensitive materials and improves measurement repeatability by aligning the illumination spectrum with the detection range of the hyperspectral camera.

The BlackBright FMWIR can be used as a standalone solution or integrated into hyperspectral systems, including combinations with HAIP Solutions' BlackIndustry SWIR camera series and is available now.

More information here: https://www.haip-solutions.com/hyperspectral-cameras/blackbright-fast-medium-wave-ir/

## About HAIP Solutions GmbH

HAIP Solutions GmbH, based in Hannover, Germany, develops integrated hyperspectral imaging solutions for industrial and research applications. The company's portfolio includes hyperspectral cameras covering VNIR to SWIR ranges, application-specific illumination systems and software for data acquisition and classification. HAIP focuses on delivering reliable, application-ready systems that simplify the use of hyperspectral technology in real-world environments.