

JAI's new 2-CCD camera

AD-080CL

provides simultaneous images of both the visible and near-infrared light spectrums

AD-080CL multi-spectral 2-CCD solution features

- *1/3" progressive scan camera*
- *1024 (h) x 768 (v) pixels*
- *Up to 30 frames/second*
- *Continuous or triggered operation*
- *Channel balancing by gain or by exposure time (individual)*
- *Camera Link® interface and GigE Vision™ interface*
- *NIR cut-off at 760 nm*

In certain machine vision applications, the ability to see inside an object is just as important as the ability to capture its outward appearance. For years, imaging professionals have struggled to combine imaging in both regions - but the solutions were either too costly or too difficult to deploy and maintain. The launch of JAI's new multi-spectral camera ushers in a new era of affordable imaging.

The AD-080CL is a cost-efficient camera that simultaneously measures visible and near-infrared (NIR) light spectrums through a single lens using two channels. The first channel has a Bayer mosaic color imager that only captures visible light, while the second has a monochrome imager for NIR light.

This multi-spectral imaging solution brings a new, essential dimension to a number of vision inspection applications. The visible light channel captures the red, green and blue bands of conventional imaging - or those visible to the human eye. The NIR channel, on the other hand, "sees" below the surface of organic and other materials to detect imperfections the human eye cannot see.

Many imaging applications require only monochrome cameras that work in the visible spectrum, or between 400 and 700 nanometers (nm). But certain applications require other parts of the spectrum to capture critical data. The quality of food, currency, and metals, for example, depends not only on their outward appearance - but also on the condition of tissue that may be below the surface or simply invisible to the human eye. Cameras that capture non-visible signals below 400 nm and above 700 nm are able to enhance details and see below the surface. The result is more thorough vision inspection, better quality verification - and, ultimately, higher quality products.

The advantages of 2-CCD technology compared to traditional multi-spectral technology

Although the imaging industry has used multi-spectral applications for a number of years, the traditional solutions have remained costly and difficult to deploy.



One solution has been to simultaneously use two cameras: one for the visible spectrum and another for the NIR. Although seemingly simple from the user's point of view, the two-camera solution is not only expensive, but also inefficient and potentially inaccurate, as the cameras need to be carefully and frequently aligned to ensure the same field of view. Moreover, working with twice the equipment - two cameras, lenses, sets of cables, and so on - adds to the complexity of the application and decreases reliability.

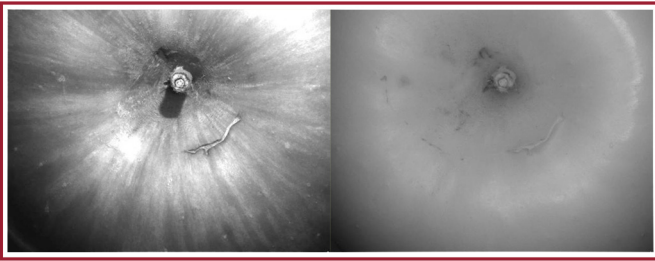
Previously, the best alternative has been to use high-end multi-spectral 4-CCD: four-channel cameras that capture red, green, blue, and NIR spectrums. Although these complex cameras provide excellent results, they are expensive to buy and maintain.

New application possibilities thanks to easier deployment, greater accuracy and lower costs

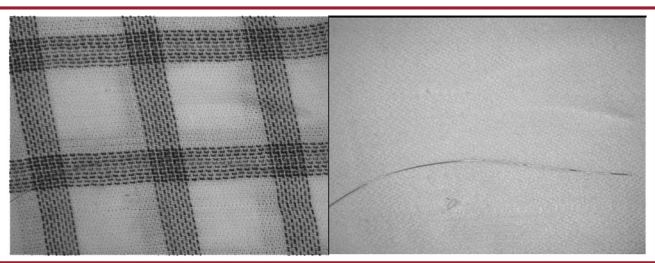
JAI's new 2-CCD technology not only enables users to measure both visual and NIR light with a single camera, but also offers easy set-up and alignment. Practical and cost-efficient, the AD-080CL is ideally-suited for a large variety of applications, including:

- **Inspection and sorting** of food, such as fruit, vegetables, nuts, meat, and grains - including the ability to check the contents under printed packages
- **Print inspection** of packaging, such as cosmetics and food packaging
- **Surface inspection** of textiles and other flat products
- **Print board inspection**
- **Electronics inspection**
- **Security print inspections** including currency, checks, airline tickets, lottery tickets, and passports
- **Advanced surface property and quality inspection** of wood, metal, and other materials

The camera's spectral separation provides critical image information across a wide range of inspection tasks. In food inspection applications, for instance, the visible spectrum channel captures clear images of the surface properties and checks for ripeness, while the NIR channel checks for early signs of decay, mechanical bruising and pest damage below the surface. If a fruit is the right color, most of the light from the NIR signal bounces back. When one area of the fruit absorbs more light than the others, it's likely that the area's cell structure is different from the rest of the fruit - indicating internal decay or damage.



In many cases, human eyes cannot distinguish between defects and natural color variation. The NIR channel allows the AD-080CL to easily pick out imperfect items.



The NIR channel detects hard-to-see flaws hidden in fabrics - in this case, a human hair.

The technology behind JAI's multi-spectral breakthrough

Though many camera manufacturers produce prism-based cameras, the ability to customize the prism optics to create a robust 2-CCD solution has proved a challenge. JAI's unique research and development capabilities, combined with its multi-prism camera expertise, have enabled the company to be the first to bring the much-needed solution to market.

JAI has developed unique manufacturing equipment that enables high-precision bonding of image sensors onto the prism assembly. This makes the AD-080CL more cost-efficient to produce than other solutions on the market - and allows JAI to offer the camera at a more competitive price.

The 2-CCD AD-080CL is based on the technology found in JAI's 3-CCD solutions - but is specifically designed to manage visible and NIR light information. These two spectral bands are fully separated in the prism by diachronic coatings, so they do not affect one another. The result is true multi-spectral information from each channel.

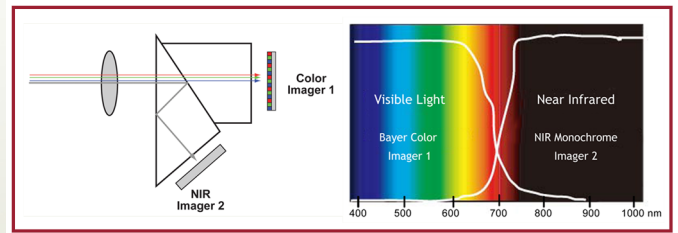
The AD-080CL aligns the visible and NIR images within one fourth of a pixel (a level of precision that's not possible with two separate cameras) and maintains this stable alignment throughout its lifetime.

These spectral curves show the filters' spectral behavior. The diachronic coatings on the prism separate the color and NIR light information.

Greater flexibility for broader applications

The AD-080CL, the first camera in JAI's AD-080 series, integrates seamlessly with the CameraLink™ interface. JAI is planning to release models compatible with GigE Vision™ and other interfaces in the near future.

Designed to bring inspection capability to previously inaccessible places on the processing line, the AD-080 CL features a



1/3" prism that allows for a small camera housing design of 55H x 55W x 80L mm. For the best imaging results, the camera features standard C-mount lenses, which give a higher degree of lens flexibility and further reduce production costs.

The choice between continuous and triggered operation means the camera can either produce a continuous stream of images in free-running mode - or can be triggered to capture single images. And separate exposure time for each channel allows the channels to be adjusted to one another without changes in the gain - maintaining a consistent signal-to-noise ratio at all times.

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