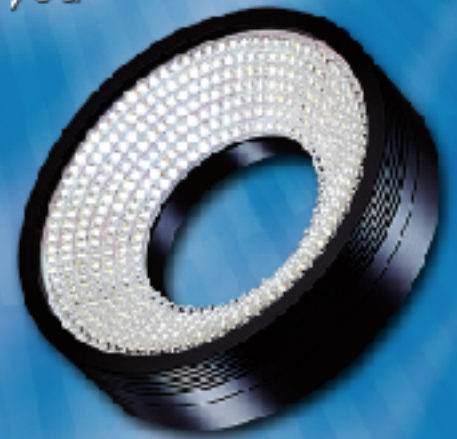


World's highest standards of LED Lighting Technology  
Let our expertise work for you



# LIGHTING SOLUTION

LED Illuminators for Machine Vision

# Environmentally Friendly

Contributing Society through the Science of Light

# LIGHTING SOLUTION



## About Global Warming

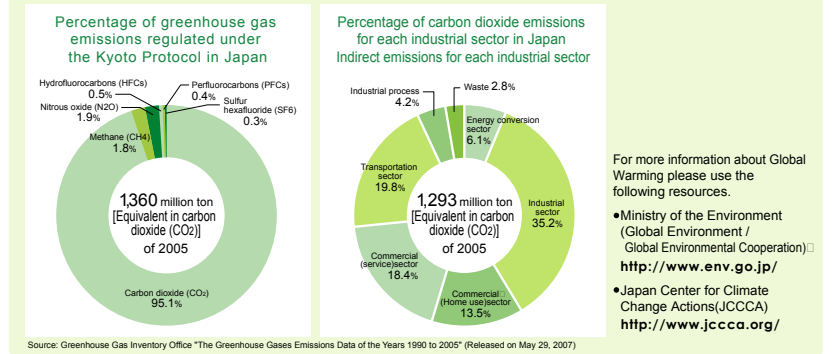
In Kyoto in 1997 the United Nations Framework Convention on Climate Change defined the reduction targets of greenhouse gases such as carbon dioxide that are the cause of global for individual countries. □

Japan ratified the "Kyoto Protocol" in June 2002 and put the Protocol into practice in February 2005, setting up a target to reduce its collective emissions of greenhouse gases by 6% of those emitted in 1990.

Carbon dioxide makes up 90% of overall emissions out of the six greenhouse gases subject to the quantified reduction commitments. Thus, reducing the emission of carbon dioxide has become a pressing urgency.

As shown in the graph below emissions from the "Industry Sector" makes up nearly 40%, the largest emission source.

Thus the Kyoto protocol calls for CCS and it's suppliers to take specific action to reduce emissions of carbon dioxide and other greenhouse gasses along with Japan and the rest of the world.



## Costs Comparison between CCS High-intensity LED Spotlight and Halogen Light

\*\*1) For detail information on the HLX-24 Series High-intensity LED Spotlights, please refer to information on page 51.

### High-intensity LED Spotlight



- High-intensity LED Spotlight ¥ 48,000
- Dedicated power supply □ ¥ 36,000
- Initial investment ¥ 84,000**

### 50W Halogen Light



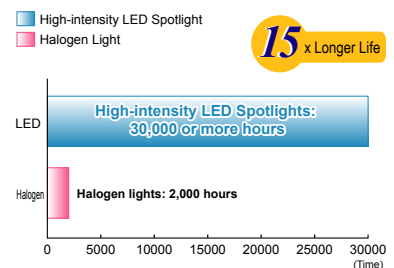
- 50W halogen light source □ ¥ 30,000
- Straight light guide (1 m) □ ¥ 19,000
- Replacement lamp (1 piece) □ ¥ 4,200
- Initial investment □ ¥ 49,000**

### Lowest lifetime cost

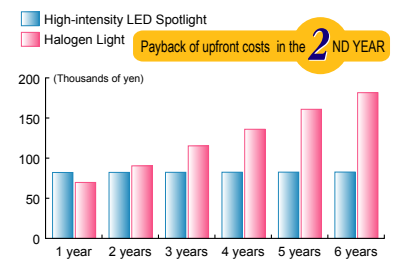
Replace halogen lights now in use with the HLX Series High-intensity Spotlights to see substantial reduction in total operating costs. Despite lower upfront costs, Halogen lights, are significantly more expensive than a comparable LED high-intensity spots lights over their useful life. Halogen lights only have a lifetime of 2,000 hours on average and can last as little as 50 hours. This frequent burnout requires replacement and adjustment of the bulb and drives up labor costs and machine down time. In contrast, CCS's HLX Series of high-intensity LED spotlights under full

power and continuous use will only lose 50% of max intensity after 30,000 operating hours-15 times longer than halogen light burnout lifetime. With care they can last more hours before significant decreases in their maximum intensity occur, this is without any sudden burnouts. Thus LED lights are clearly a less expensive purchase in the long run and will pay for themselves long before their useful lifetime is reached.

### Lifetime Comparison



### Total running cost Comparison



\*Comparison between 50W Halogen Light and HLX-24RD (Red Light) Series High-intensity LED Spotlight made by running at maximum power for 24 hours. Cost data assumes an electricity cost of 9 yen/kWh/month and excludes the basic charge.

## Comparing Carbon Dioxide Emissions of CCS High-intensity LED Spotlight and Halogen Light

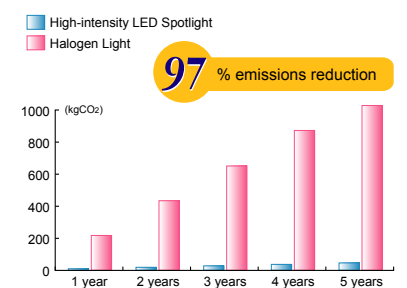
### Comparison of Emissions of Carbon Dioxide

\*Calculated by multiplying power consumption □ by emission factor (i.e., 0.555kgCO<sub>2</sub> per 1kWh).

	High-intensity LED Spotlight	Halogen Light
Carbon dioxide emissions	<ul style="list-style-type: none"> <li>● Power consumption per day: 1.4W (Power consumption for lighting) x 24h=33.6Wh</li> <li>● Yearly power consumption: 33.6Wh (Power consumption per day) x 365(days)= 12,264Wh</li> <li>● Emissions of carbon dioxide: 0.555kgCO<sub>2</sub>/1kWh 12.264kWh x 0.555kgCO<sub>2</sub> = 6.8kgCO<sub>2</sub> (Yearly emissions)</li> </ul>	<ul style="list-style-type: none"> <li>● Power consumption per day: 50W (Power consumption for light sources) x 24h=1200Wh</li> <li>● Yearly power consumption: 1200Wh (Power consumption per day) x 365(days) = 438,000Wh</li> <li>● Emissions of carbon dioxide: 0.555kgCO<sub>2</sub>/1kWh 438kWh x 0.555kgCO<sub>2</sub> = 243.1kgCO<sub>2</sub> (Yearly emissions)</li> </ul>
Emissions 1 year later	6.8kgCO <sub>2</sub>	243.1kgCO <sub>2</sub>
Emissions 2 years later	13.6kgCO <sub>2</sub>	486.2kgCO <sub>2</sub>
Emissions 3 years later	20.4kgCO <sub>2</sub>	729.3kgCO <sub>2</sub>

development of the Micro Fiber Head Series enables CCS to offer new termination light patterns that are not available with the halogen lights.

### Carbon Dioxide Emissions Comparison

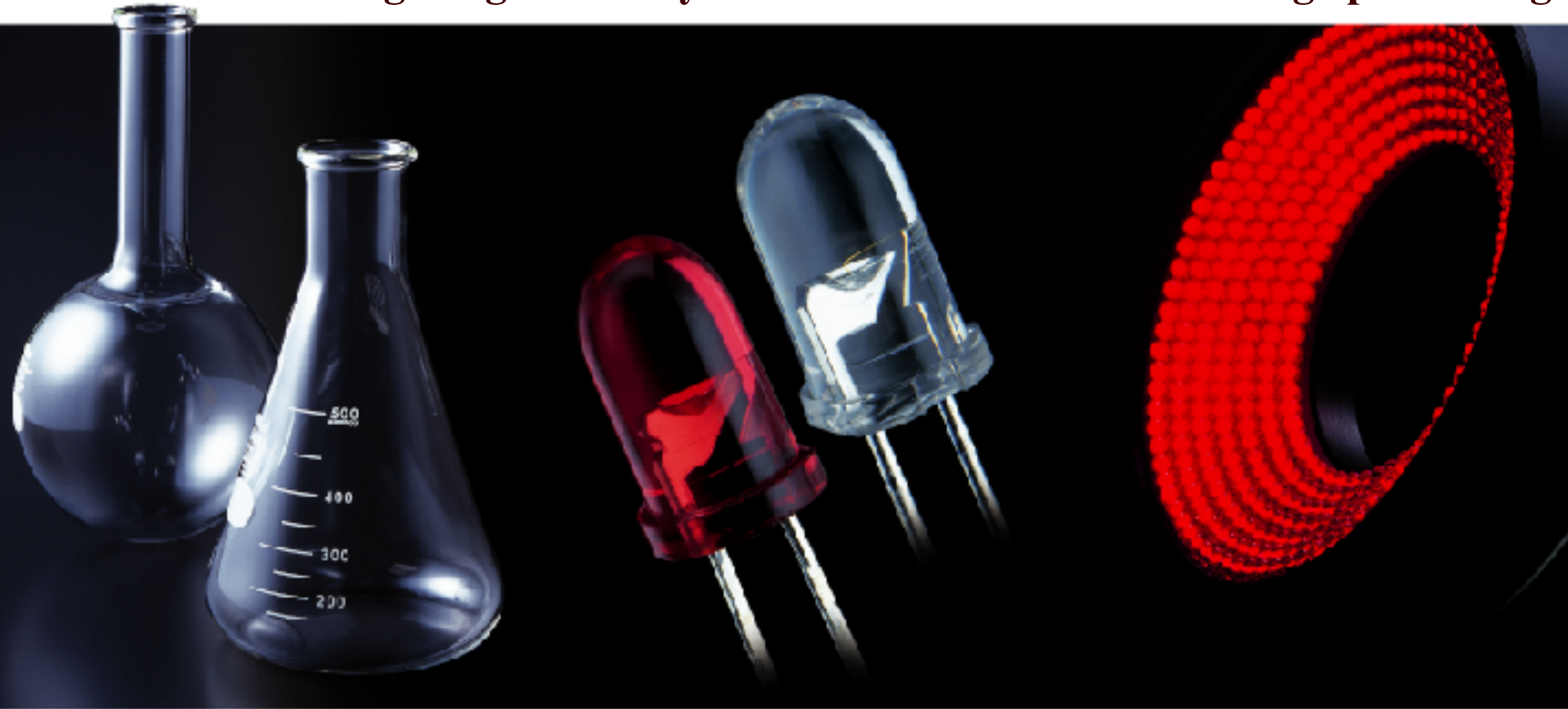


# Know

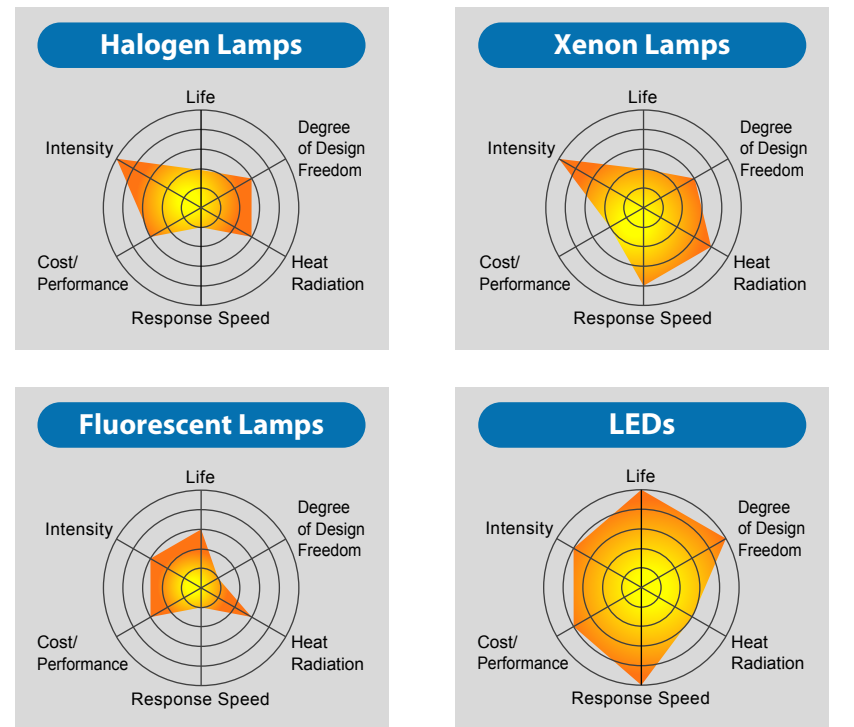
We know that lighting is the key to successful

image processing.

# LIGHTING SOLUTION



## Comparison of Image Processing Illumination Systems



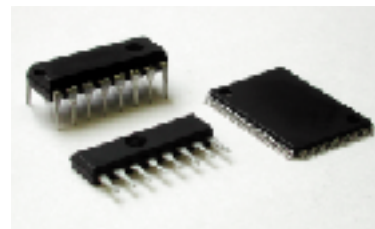
## Development in Image Processing and the Mission of Illumination

Recently, image processing devices with high performance and low price come to the market one after another. The fields of application of them, such as the detection of appearances, the decision of position and the assembling of products become wider and wider. It is mainly due to the high-speed processing, the improvement of sensitivity, the improvement of the processing performance of CPU of a personal computer and the development of the device technology. This means that it is difficult to discriminate one maker treating image processing devices from others. As for end-users, it is possible to budget for illuminations because the price of image processing units is low.

The recognition that the success of introducing an image processing system depends on the lightings becomes widespread.

To realize a stable system, it is a necessary condition to get images with sharp contrasts constantly in spite of the

various changes of external conditions, such as external noise lights, the lean of a work, the variation of materials and the type of a system. Keeping this in mind, it is important to choose an illumination system that can overcome the factors normally present in a factory setting, yet still provide superior, high contrast images. Unfortunately, there is no one universal illumination system that would be applicable to all types of work such as the manufacturing of semiconductors, electronic parts, medical products, food products, printed materials and automobile parts. In order to achieve maximum stability under a limited set of conditions, it has become even more vital to select the best type of illumination for



the target application from the many systems that are available. Many times this requires custom lighting development. As the adage goes "better to light than write!" This evolution has naturally spurred massive development in the area of illumination. In spite of this, 20% to 30% or more of all work requiring illumination still cannot be solved with standard solutions, requiring custom illumination development and further driving the advancements in illumination. Indeed, it is clear that the future advancement of image processing technology must go hand-in-hand with the requisite advances in illumination.



## Why is LED illumination so important now?

### 1. Flexible Shape Design

A LED illumination system consists of a collection of individual LEDs, providing much greater shape flexibility than other illumination systems and allowing comparatively greater freedom in designing the shape and size of the illumination system to meet application needs.

### 2. Long Life

In order for an image processing unit to maintain a consistently precise level of detection, the system must be able to provide stable image input over the long term.

Our LED illumination systems have an intensity half-life of from 10,000 to 30,000 hours under continuous use, far greater than other types of illumination. Furthermore, by using a control system to turn the LEDs on and off, heat development can be suppressed and the life of the LEDs more than doubled.

### 3. Fast Response

LEDs have fast response time and display their greatest strength by switching multiple illuminations or switching multiple circuits in a single illumination. In addition, they may be synchronized with a strobe or camera and may be regulated with high-precision pulse modulation. When used together with our power source, our LED illumination can reach the maximum luminance within 10µ sec after a trigger signal is input.

### 4. Selectable Color

In addition to flexible format design, another important aspect in achieving stable images is selectable illumination color. The recorded image will vary greatly depending on the light color of the illumination system, even when the same illumination format is used. We are also putting major effort into the development of contrast technologies based on light color.

### 5. Low Total Running Cost

A low initial installation cost can be quickly negated by costs related to daily operation and maintenance. Other types of illumination not only consume from 2 to 10 times more electric power than our LED illumination systems, many also require that the light source be changed monthly, consuming the valuable time of a company's manufacturing engineers.

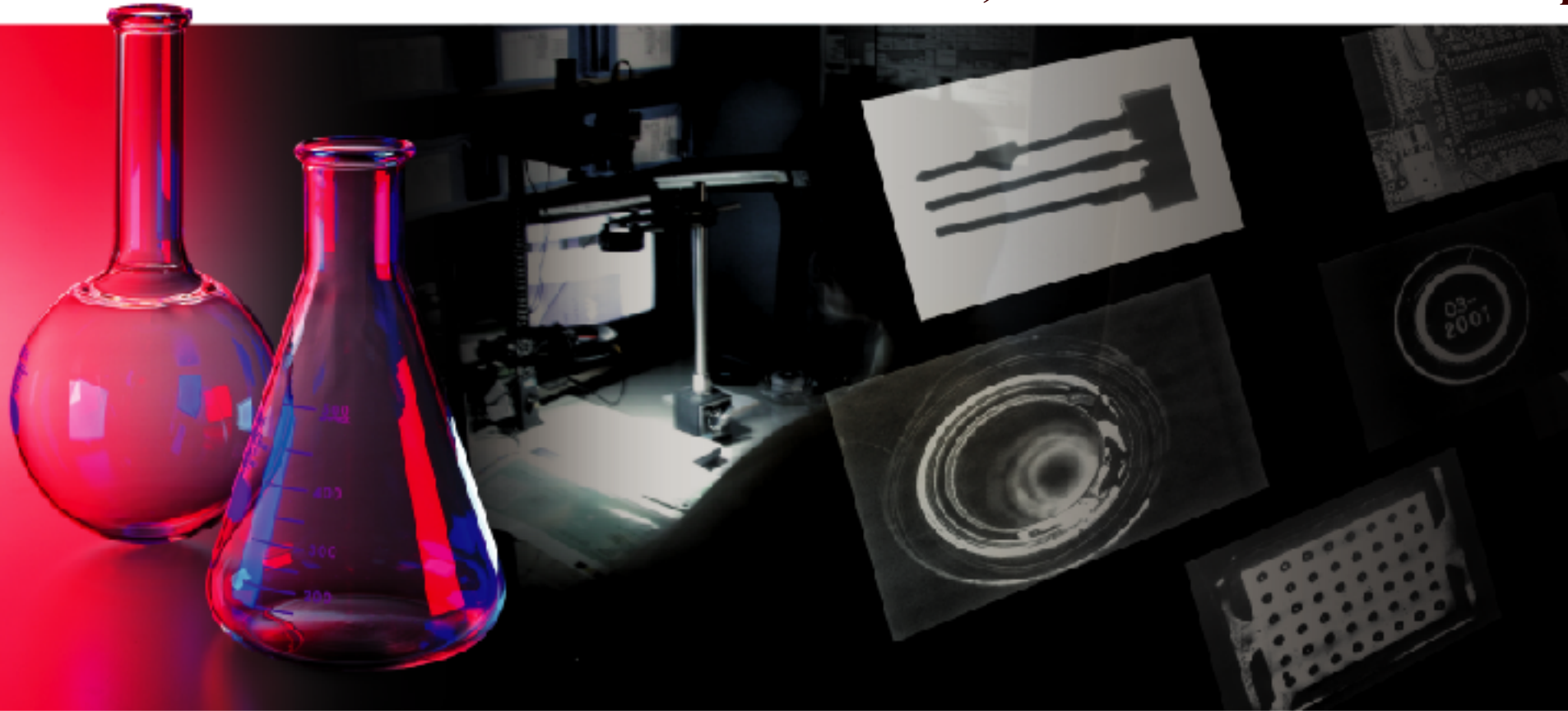
The more illumination systems that are installed, the greater the cost of both light source replacement and human labor. Therefore, installation of long-life LED illumination systems also offers a great advantage in terms of cost performance.

The necessity of customization.

# Think

The desire to meet our customers' needs of 3,000 has

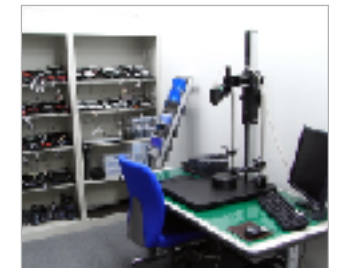
led us to develop an advanced customization system.



# LIGHTING SOLUTION

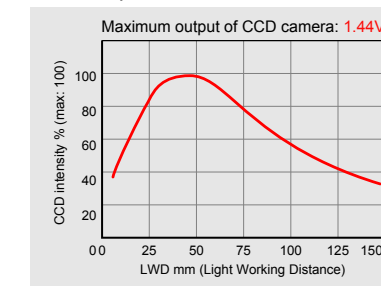
## Technical Support

When selecting a LED illumination system, we first establish methods for measuring CCD sensitivity chart, brightness distribution, luminosity characteristics etc.--factors that are useful in determining the distance between the light source and work piece. We then standardize the data for each device type. Please see page 69 for additional details, or contact our company for additional information about products that are not listed in this catalog.

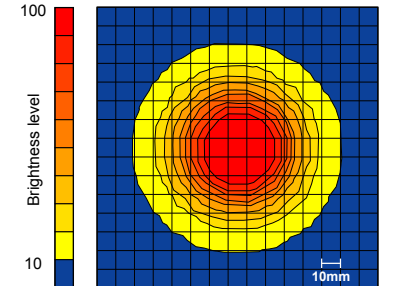


### Example: CCD Sensitivity Chart / Brightness Distribution (LDR2-90RD)

CCD intensity vs LWD



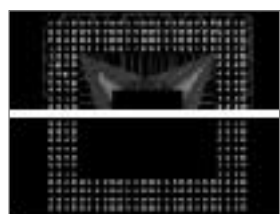
LWD:50mm



## Development

As our company strives to meet the diverse needs of all our customers, we have come to realize that the advantages offered by LED illumination - compact size, low power consumption, long life and design flexibility - make LEDs ideally suited to a diverse range of work applications.

When imaging identical work pieces using identical illumination, the installation position and illumination angle can greatly affect the resulting image. Therefore, four aspects of the work process must always be considered when developing an illumination system.



## The four points to specifying a lighting solution.

### 1 Application

Image processing applications can be classified into four general groups: visual inspection, character recognition, measuring dimensions, and positioning. In designing a lighting system, it is necessary to optimize the signal-to-noise ratio of the acquired image by adjusting the irradiation wavelength and the parallelism of the light for each of these applications.

### 2 Workpiece to be illuminated

Attention must be paid to the wavelength and parallelism of the specified light, carefully matching it to the physical characteristics, surface status, shape, material, and color of the object and features to be imaged.

### 3 Imaging and optics system

As the solid angle of the utilized light changes significantly depending on the FOV range, work distance, and numerical aperture, the image will change in a similar way as it changes when lighting is changed. In addition, the lighting system is dependant on whether the imaging method is area or line.

### 4 Operation mechanism and ambient environment

The shutter speed and scan rate will change depending on whether the workpiece is stopped or moving, so techniques to optimize of the quantity of light such as strobing and overdriving may be necessary, as well as designing resistance against ambient conditions such as moisture, vibration, and ambient light.

## Quality

Our company has developed a system for customizing light sources to meet a diverse range of needs. Still, one problem we face in the manufacturing process is the quality control of individual LEDs. To achieve a high level of quality control, CCS uses its own original manufacturing and inspection processes for strict product inspection and control. The Vf value is measured individually for each LED type. The LEDs are then carefully sorted according to their measured Vf value, intensity rank and color rank, and installed in the illumination system for the first time. The layout of the LED array is also a very important factor in achieving even illumination. At CCS, we have established a special method that aligns each individual LED perpendicular to the circuit board. Our control system has successfully minimized the number of product defects and the degree of variance between products, making it possible for us to supply consistently high-quality, stable products.

## Finding the answers at last.

Answers to questions that we have faced over many years have led us to develop seven comprehensive principles for our company.

### 1. Quality Guarantee

With strict quality control covering the screening, mounting, assembly and shipping of LEDs, CCS provides a radiation warranty for one year (if the amount of radiation is decreased to 50% or less within the term of the warranty, the product is repaired or replaced free of charge). With our confidence in our products and sense of responsibility, CCS warrants its products against defects in materials and workmanship for two years after the shipping date from CCS. (See pg. 76)

### 2. Inventory Management

300 kinds of CCS standard products are always ready to be shipped.

### 3. Achievements & Reliability

Since 1993 CCS has provided solutions for more than 40,000 machine vision applications. We have designed, developed, and manufactured more than 4,000 custom lighting systems. Based on this track record,

we are confident we can offer the best lighting solution to meet the widest and most difficult variety of applications.

### 4. Inventions & Patents

We have been always making efforts to invent and develop new products and technology with pride of being the No.1 LED illumination manufacturer. Our products are protected by over 250 industrial property rights and patents all over the world.

### 5. Data Analysis

We have standardized the data of our all products, such as brightness distribution charts.

### 6. Technology Support

We provide customers with the world's best illumination technology consulting and free testing before the purchase. We help you select the most suitable illumination in the best condition.

### 7. Free Lending

Thousands of lights in hundreds of models are available for free lending before purchasing. We also give you full of advice and consulting for each illuminator.