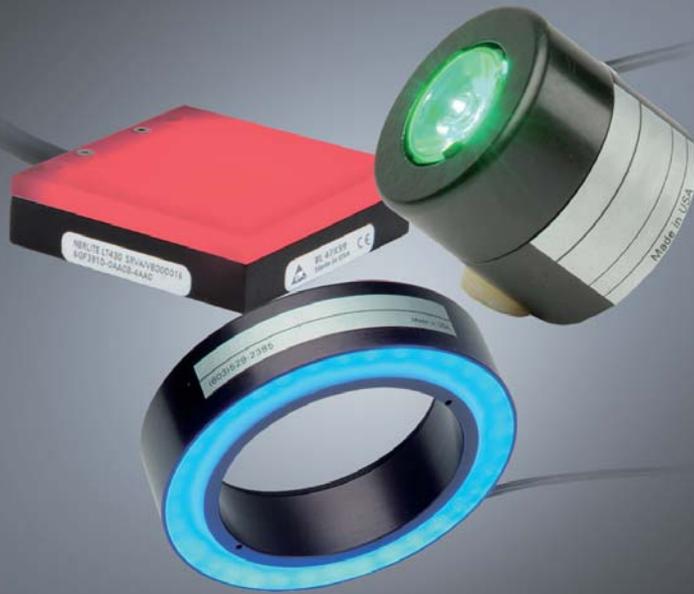


NERLITE®

Precise Lighting for Machine Vision



MICROSCAN®

| Precision Data Acquisition
and Control Solutions

NERLITE

Precise lighting for Machine Vision

The better the lighting solution, the better your machine vision system will perform. Accurate, reliable and repeatable performance means greater productivity at a lower cost to you.

Innovative NERLITE® lighting products have enabled machine vision and Auto ID systems to perform reliably in simple or challenging applications. Our NERLITE product line, the longest-established brand of machine vision lighting, has grown and been refined from our experience with hundreds of applications in dozens of industries. Ranging from cost effective solutions for common applications, to technically advanced implementations for challenges involving transparent, highly specular, round or irregularly shaped objects and surfaces, there is a NERLITE solution to your lighting problem.

NERLITE Technology

Microscan Machine Vision Lighting products are manufactured under the brand name of NERLITE. NERLITE is widely recognized around the globe as the "standard" for machine vision illumination and machine vision imaging. The NERLITE brand encompasses a wide selection of products, including:

- Area Arrays, Spot Lights, Linear Arrays (Line Lights), Ring Lights, or Dome Illuminators
- Backlight and Dark-Field Illuminators
- DOAL® & COAL – Diffuse On-Axis Light® & Collimated On-Axis Coaxial Lights
- SCDI® – Square Continuous Diffuse Illuminator
- CDI® – "Cloudy Day"® Continuous Diffuse Illuminator
- MAXlite – Multi-Axis Light
- and also NERLITE designed custom illuminators for OEMs

Lighting Techniques

NERLITE machine vision lighting products are designed to control light delivery to the CCD array (camera). There are many lighting techniques to choose from. For a starting point in choosing the best lighting technique for your machine vision imaging application, see our light selection chart.

Highlights

- **Cost-effective**
Save research and design expense with complete packaged lighting solutions
- **Turnkey**
Off-the-shelf solutions for hundreds upon hundreds of applications
- **Proven**
Thousands of NERLITE lighting solutions in service worldwide since 1988
- **Modular and compact**
Save integration effort and machine space
- **Reliable**
Long-life, minimal service, LED-based designs with worldwide support
- **Large variety of lighting solutions**

Our team of lighting experts is ready to evaluate your application and configure a NERLITE solution: one that delivers the high-contrast images your vision system needs for feature or flaw detection, no matter how difficult the challenge.

Microscan's sales and support network, a combination of inhouse expertise and industry partners, spans the globe to provide fast access to NERLITE solutions and support for your business.

Applications

- Fiducial Locations
- Blister Packs
- Semiconductor
Wafers and Dies
- Ball Grid Arrays
- Dispensing
- Tinned PCBs
- Solder Packs
- Direct Part Marking
Scanning
- Vial Scanning
- Robotic Guidance
- Print on Foil
- OCR and OCV
- Beverage
Containers
- Label Inspection
- Component
Presence

Industries

- Automotive
- 2D Symbology/OCR
- Mail/Package
Sorting
- Printing
- Electronics
- Pharmaceutical
- General
Manufacturing
- Warehousing
- Semiconductor
Packaging
- Food and
Beverage
- CD/DVD
Production

...and more!

NERLITE

The right lighting solution for every application

Use the “A T-E-S-T” method to identify the effects of different lighting techniques on part features. Select a relevant feature of your part, then compare the effects of the various lighting techniques on that feature.

The goal is to select a lighting technique that creates the highest possible contrast between the feature of interest and its surroundings.

	Part Feature ¹⁾	Backlight	DOAL	LALL Rings & Arrays	DOME, SCDI, CDI ²⁾	Dark field	Examples
A	Absorption ⁴⁾ Look for change in light absorption, transmission or reflection	None	Uniformity of technique ensures absorption changes on flat surfaces are observable	Application dependent	Uniformity of technique ensures absorption, changes on bumpy surfaces are observable	Minimal effect	<ul style="list-style-type: none"> ■ Fuses in block ■ Ink printed matter ■ Plastic caps ■ UV emission ■ IR through plastic
T	Texture ³⁾ Look for change in surface texture or finish	None	Textured surfaces darker than polished	Application dependent	Minimizes texture	Textured surfaces brighter than polished	<ul style="list-style-type: none"> ■ Polished surface ■ Laser annealed ■ Sandpaper grit ■ Scratched surface ■ Material change
E	Elevation Look for change in height from surface to camera	None	Angled surfaces are darker	Application dependent	Minimizes shadows	Outer edges are bright	<ul style="list-style-type: none"> ■ Notched part ■ Dot-peen mark ■ Embossing ■ Engraving ■ Angled/beveled ■ Foreign debris
S	Shape Look for change in shape along the x/y axis (contour)	Shows outside contours	Changes evident if background is different	None	None	Contour highlighted, flat surfaces darker than raised	<ul style="list-style-type: none"> ■ Parts on conveyour ■ Coins ■ Edge dimensions ■ Short shot ■ Injection molding
T	Translucency Look for change in density-related light transmission	Shows changes in translucency vs. paqueness	Minimizes clear, flat overcoats (e.g. glass, varnishes) if background is different and shows changes in translucency vs. opaqueness if background is different	Application dependent	Minimizes clear, bumpy overcoats (e.g. plastic overwrap, curved glass) and shows changes in translucency vs. opaqueness if background is different	None	<ul style="list-style-type: none"> ■ Drilled hole ■ Thin area in plastic ■ Plastic lens ID number ■ Multilayer material ■ Debris in liquid ■ LCD inspection

1) Surface absorption is effected by the color (spectrum) of illumination. Surface texture, elevation, shape and translucency are effected by the direction of illumination.

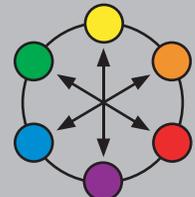
2) Uniformity of lighting increases in ascending order from Domes to SCDIs to CDIs.

3) Texture is both the presence of texture (matte, diffused, bumpy, rough) or its absence (shiny, specular, reflective, polished, smooth, glossy).

4) Using the opposite light spectrum will make a part feature appear darker. Using the same light spectrum will make a part feature appear lighter.

Examples:

- If the part feature you want to make darker is red, use a green light.
- Use a green light to make a green feature appear lighter.



Effects of lighting techniques on a ball bearing



The ball bearing



Fiber Optic Ring Light



Fluorescent Ring Light



Diffused Dome light



NERLITE DOAL



NERLITE SCDI



NERLITE CDI

Large Area LED Lights - LALLs



For illuminating small to very large areas, from close proximity or at a distance, or whenever very high intensity is required: NERLITE LALLs are the solution.

Designed to comply with NEMA 4X and IP-64. LALLs are suitable for indoor or outdoor use, provide protection against falling and splashing liquids (e.g., washdown), seal out non-hazardous dust, lint and fibers, and are corrosion resistant.

The LALL's high intensity, lower power consumption, compact and easily integrated design, strobe capability and long-life make them ideal for both new installation and as replacements for less robust light sources (e.g., fluorescents).

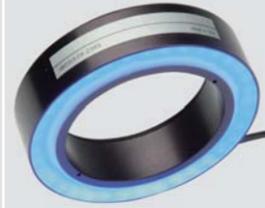
Area Array



An Area Array's general purpose, unidirectional design (adjustable via mounting position) may be used for dark-field (creating shadows and specular reflection) or for bright-field lighting for diffused surfaces.

As with other incident (aka "front") lighting choices, subtle adjustments to working distance and angle of light delivery can deliver good image contrast for minimal investment.

Ringlights



Ringlights can be an economical, easily integrated (direct attachment to lens) choice for illuminating diffused surfaces.

As with other incident (aka "front") lighting choices, subtle adjustments to working distance and angle of light delivery can deliver good image contrast for minimal investment.

Backlights



Backlights provide diffused illumination from behind the subject. Used to outline a part's overall shape, minimize visibility of clear housings, and to view openings such as drilled holes.

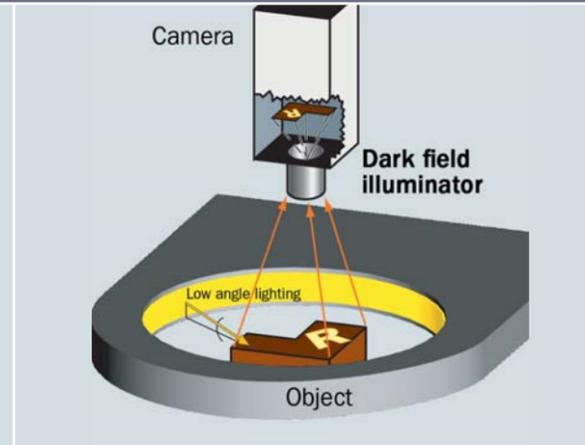
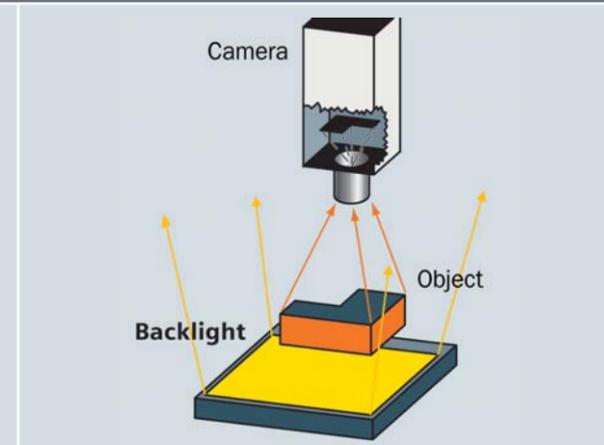
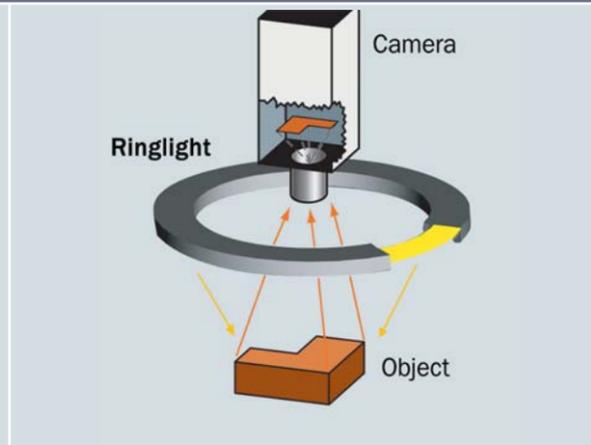
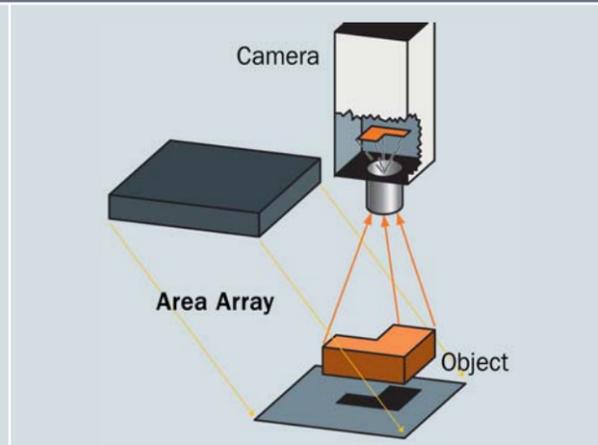
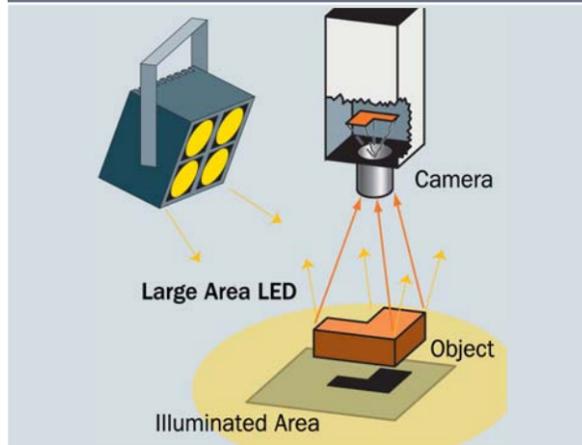
Darkfield



NERLITE DF-Series Dark-Field Illuminators provide effective low-angle lighting to targeted regions.

Dark-Field Illuminators enhance the contrast of surface features such as laser embossed or engraved marks or surface defects.

Functionality



Typical Applications

- Robotic guidance/manipulation
- Package sorting inspection
- Traffic monitoring
- Food processing and packaging
- Automotive/Aerospace assembly
- Large surface inspection (roadways, railways, runways)

- Illuminate flat, diffused surfaces
- Control costs
- Non-diffuse incident (front) lighting
- Dark-field or bright-field lighting
- Label placement inspection

- Illuminate flat, diffused surfaces
- Control costs
- Inspection of circular objects (gaskets, washers)
- When direct attachment to lens is required
- Lab use where interchangeable optics such as diffusers or fresnel (focusing) lenses are desired
- Label inspection

- Locate or measure outside dimension
- View openings (e.g., drilled holes)
- Diminish clear glass or plastic housings
- Measure thickness of materials
- Locate mounting holes
- Measure translucency
- Diffuse incident (front) lighting

- BGA ball placement
- Reading laser-etched symbologies
- Inspecting surfaces with geometric contours
- Label inspection applications
- Make textured surfaces appear bright
- Emphasize elevation changes

Application Examples



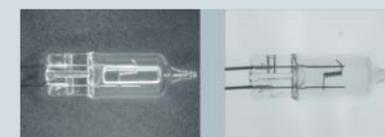
Object: Housing assembly. Detect presence/absence of fasteners.



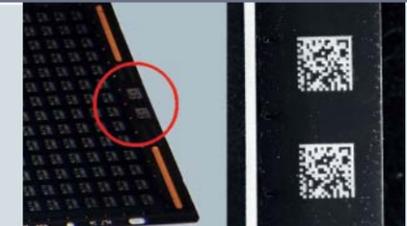
Object: Labeled bottle. Image captured with Area Array. Inspect for label presence or absence, correct label and proper orientation.



Object: O-ring gaskets. Excess material ("flash") detected at 11 o'clock position.



Object: Miniature lamp. Image captured with Backlight. Inspecting integrity of lamp filament.



Object: Circuit board with Data Matrix. Image showing high contrast Data Matrix.

NERLITE Accessories

NERLITE accessories provide the customer with a complete lighting solution. The accessory list includes the necessary power supplies and drivers to provide the customer with various operation modes ranging from continuous to strobe.

They also provide the ability to adjust many lighting parameters to tackle the most challenging lighting and vision applications.

Examples:

- LED Lighting Controller: includes the power regulation, intensity control, timing and triggering functions required for machine vision systems

Note: Controllers do not supply power; a separate power source is required.



- Filter Thread Mount: Lens Adapter for "V2" Ring lights



- LED Lighting Driver: stable constant current output for driving LED lighting

Note: Drivers do not supply power; a separate power source is required.



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