

**RVSI** **NER** **Designers and Manufacturers of**  
**NERLITE**  
 Machine Vision Illumination

**Welcome**

**NERLITE**  
DOAL<sup>®</sup>-50-LED

machine vision  
illumination

---

---

---

---

---

---

---

---

**Agenda**

- Who is NER?
- Why use Professional Illumination?
- Illumination Techniques, an Overview!

*Presented By:*  
 Dirk Vermeersch  
 European Sales Manager  
 Tel: +32 2 331 32 03  
 e-mail: dirk@nerlite.com

nerlite **RVSI** **NER** your best choice in machine vision illumination!

---

---

---

---

---

---

---

---

**NER History**

- North East Robotics was founded in 1988
- Focused on Machine Vision Integration
- Pioneered Development of Proprietary Illumination Solutions
- Engineered Line of Machine Vision Lighting Products
- Acquired by RVSI May 30, 1996
- 9 Employees in 1996

nerlite **RVSI** **NER** your best choice in machine vision illumination!

---

---

---

---

---

---

---

---

## NER Today

- Manufacturer of Lighting and Imaging Systems for Machine Vision and 2D Symbology
- Multiple Patent Awards
- Over 250 Standard and Custom Solutions
- Global Player
- NER online @ [www.nerlite.com](http://www.nerlite.com)
- 30+ Employees



---

---

---

---

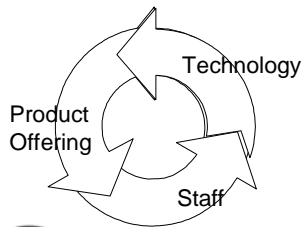
---

---

---

---

## NER Strengths



---

---

---

---

---

---

---

---

## A Simple Definition

- What is the Least Amount of Words you can use to Accurately Define Machine Vision?

**Three word definition of machine vision:** *Computerized Light Measurement*



---

---

---

---

---

---

---

---

### What Does The Customer Want?

- A Cost Effective, Reliable Solution
  - ❖ Feature Separation (Contrast)
  - ❖ Maximum Contrast for Features of Interest
  - ❖ Minimum Contrast for Features of No Interest
  - ❖ Minimum Sensitivity to Feature and Environment Variations



---

---

---

---

---

---

---

---

### Lighting is Part of the Solution

- To Know What is Optimum, Requires Knowing First The Task!
- Avoid 'Garbage In, Garbage Out'
- Create the BEST Image First



---

---

---

---

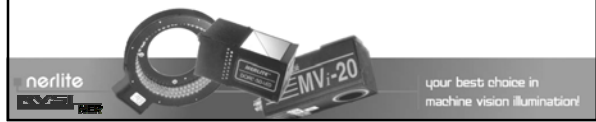
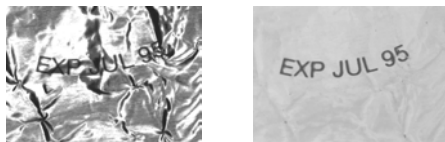
---

---

---

---

### Comparison Images



---

---

---

---

---

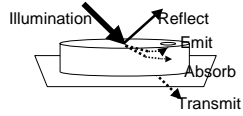
---

---

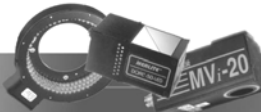
---

## Illumination = Energy

- Energy is Never Lost, Only Changed
- Light is Changed by:
  - ◇ Reflection
  - ◇ Absorption
  - ◇ Transmission
  - ◇ Emission



nerlite



your best choice in machine vision illumination!

---

---

---

---

---

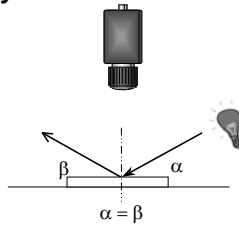
---

---

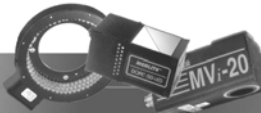
---

## Reflection Geometry

- Even The Brightest Light Will Not Reach The CCD Array if it is at The Wrong Angle of Incidence



nerlite



your best choice in machine vision illumination!

---

---

---

---

---

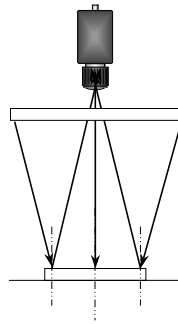
---

---

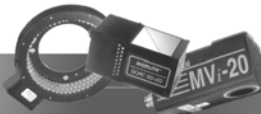
---

## Reflection Geometry

- Understanding How Light Reaches the CCD Array [Ray-tracing]



nerlite



your best choice in machine vision illumination!

---

---

---

---

---

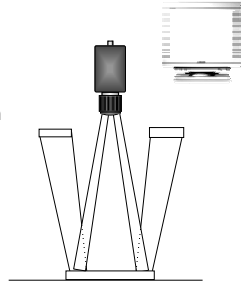
---

---

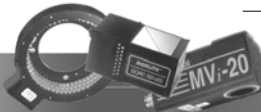
---

### Reflection Geometry

- Absence of Illumination Results in Non-Uniformity. Think of The Dark Area On An Image As An "Absence of Light Reflected to the Camera"



nerlite



your best choice in machine vision illumination!

---

---

---

---

---

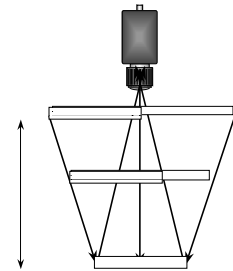
---

---

---

### Reflection Geometry

- With This Application, the Light Height Determines its Required Size. The Higher the Light, the Bigger It Must Be.



nerlite



your best choice in machine vision illumination!

---

---

---

---

---

---

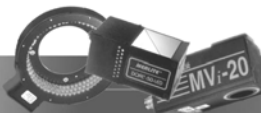
---

---

### Key Points For Machine Vision Reflection Geometry

- Light Always Reflects At The Angle of Incidence
- Darkness is Either Surface Absorption or the Absence of Reflected Light To the Camera
- Surface Angularity Determines Light Position and Width (size)

nerlite



your best choice in machine vision illumination!

---

---

---

---

---

---

---

---

### General Purpose Lighting

Area Array in Action ...  
 Ring Illumination in Action ...  
 Dome Illumination in Action ...  
 Backlight in Action ...

nerlite  
 your best choice in machine vision illumination!

---

---

---

---

---

---

---

---

### Dark-Field Illumination

*Dark-Field Illuminator in Action ...*

- Emphasize Elevation Changes
- Contrast Surface Finish
- Shape and Contour is Enhanced

nerlite  
 your best choice in machine vision illumination!

---

---

---

---

---

---

---

---

### Bright Field versus Dark Field

Bright-Field Area  
 Dark-Field Area

nerlite  
 your best choice in machine vision illumination!

---

---

---

---

---

---

---

---

### Dark-Field Illumination

nerlite  
MV-20  
your best choice in machine vision illumination!

---

---

---

---

---

---

---

---

### DOAL - Diffused On-Axis Light

*Doal in Action ...*

- Surface Finish Is Emphasized
- Angled Elevation Changes Are Darkened
- Translucency is Evident (with the right background)

nerlite  
MV-20  
your best choice in machine vision illumination!

---

---

---

---

---

---

---

---

### DOAL - Diffused On-Axis Light

nerlite  
MV-20  
your best choice in machine vision illumination!

---

---

---

---

---

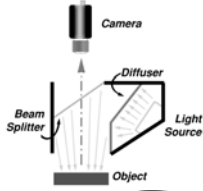
---

---

---

## Square Continuous Diffused Illumination SCDI

SCDI in Action ...



- Provides Diffuse Illumination
- Ideal for Moderately Faceted and Undulating Specular Surfaces
- Compact Housing

nerlite



your best choice in machine vision illumination!

---

---

---

---

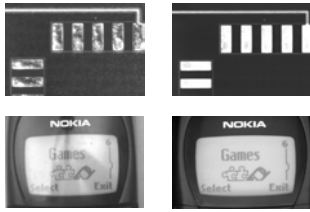
---

---

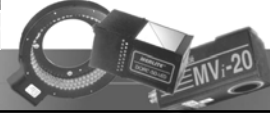
---

---

## Square Continuous Diffused Illumination SCDI



nerlite



your best choice in machine vision illumination!

---

---

---

---

---

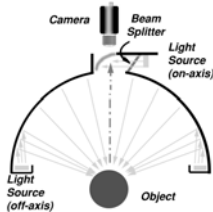
---

---

---

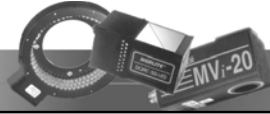
## Continuous Diffuse Illumination - CDI

CDI in Action ...



- Emphasize Surface Specularity
- Enhance Absorption vs Non-absorption
- De-emphasize Shadows And Angles

nerlite



your best choice in machine vision illumination!

---

---

---

---

---

---

---

---

**Continuous Diffuse Illumination - CDI**

nerlite  
NSI NSP NSR

your best choice in machine vision illumination!

---



---



---



---



---



---



---

**This Represents Less than 10% of Our Lighting Products**

*What was it you wanted to light?*

nerlite  
NSI NSP NSR

your best choice in machine vision illumination!

---



---



---



---



---



---



---