Ageing-related decrease in brightness of the LEDs

In addition to brightness, light distribution, light geometry and mechanical design, the ageing of the LEDs is an important criterion when selecting the light for a Machine Vision application. To achieve stable lighting conditions over the longest possible operating time, light-emitting diodes (LEDs) are used as light sources in all LUMIMAX® lights. In general, the ageing process of an LED is by a multiple slower longer compared with conventional light sources, such as halogen light bulbs or fluorescent lamps.

LUMIMAX® LED lights are developed and manufactured in such a way that at full load operation under the permissible ambient conditions at least the following expected operating hours are achieved or exceeded without the light's intensity falling by more than 30 % compared to the delivery condition:

- 80,000+ h for LUMIMAX® LED lights in the visible and infrared wavelength range

Due to the LED construction with special semiconductor materials the following operating hours are achieved in the ultraviolet wavelength range:

- 55,000+ h for LUMIMAX® LED lights in the ultraviolet wavelength range

To achieve the greatest possible irradiance values, LUMIMAX® Spot lights with only one High Power LED must be operated with a higher power than lights with several LEDs. In the ultraviolet wavelength range, LUMIMAX® High Power LED Spot lights can therefore achieve or exceed 21,000+ operating hours.

Under consideration of the following aspects, the ageing-related decrease in brightness of the LEDs and thus the lights can be slowed down significantly.

Ambient temperature

- The operating temperature at the LED has a decisive impact on its ageing process. The higher the temperature, the faster the ageing process progresses. Therefore, temperature management is an essential component of the innovative housing design of LUMIMAX® lights. The heat generated at the LED is efficiently emitted to the surroundings via the housing.
- An increase of the ambient temperature results in a higher operating temperature, which accelerates the ageing process.

Integration in machines and systems

- A form-fitting mounting of the light on thermally conductive materials facilitates an optimal heat transfer from the lighting system to the machine or the machine environment. This optimises the overall temperature of the lighting system.
- Some LUMIMAX® lighting series have passive cooling elements or cooling fins. When mounting the lights, make sure that the air circulation through the cooling fins is not impaired.

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Switch-on duration of the light

- When using LUMIMAX® lights for continuous operation, we recommend switching on the light only for the time the image is taken. Our lights have TTL and PLC inputs for fast, load-free switching. The life cycles specified above are also achieved or exceeded in continuous operation. However, the loss of brightness can be significantly reduced by reducing the temperature in switched operation.

Brightness adjustment

- The brightness of LUMIMAX® lights can be adapted to the application by using the integrated potentiometer or the analogue input.
- In General: The lower the brightness, the lower the decrease in brightness.

Flash frequency und flash time

- In addition to brightness, LUMIMAX® strobe lights can also be parameterised in terms of flash frequency and flash time within permissible ranges. The lower the flash time and / or frequency, the lower the operating temperature.
- By minimising the flash frequency or the flash time, the ageing of the lights can be slowed down.

The decisive factor for ageing-related losses of brightness in LEDs is their operating temperature - only a few degrees of temperature difference lead to an exponential increase or decrease in the loss of brightness. The lower the temperature of the light, the lower the temperature on the LED and the lower the brightness loss in the entire lighting system.

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