

4. Flash vs. continuous

As well as selecting the optimal type of lighting, wavelength and filter, additional factors can have a fundamental influence on solutions for an image processing task. Once you have identified a suitable type of lighting, it is therefore worth spending some time considering the various operating modes. Within the industry, a huge variety of terms and jargon is used to describe these modes. Choosing the right mode is also often made more difficult by the occasionally loose use of such terminology. Strobe, flash, pulse, switched and continuous lighting are just some of the many terms used in this context.

In this fourth chapter of the LUMIMAX[®] Knowledge Base, we therefore want to concentrate on talking about the three fundamental modes used in Machine Vision.

- Continuous operation
- Switch operation
- Flash operation

We will also define these terms, clarify the differences, and provide details of the pros and cons and typical applications for each mode.

4.1 Continuous and switch operation



Verifikations-System mit LUMIMAX[®] Dornbeleuchtung in einer Fertigungsstrecke des Siemens Gerätewerks Amberg

When working with continuous lighting, the light source is operated permanently with nominal current. Accordingly, it is not necessary to switch the lighting system on before recording an image. This mode is needed for rapid processes, for example, where the image acquisition frequency is much higher than the pulse/flash frequency that the lighting is capable of. As a result, this operating mode is often used for line-scan camera applications. In addition, many inexpensive lighting solutions have no switch inputs, so they can in fact only be operated in continuous operation.

Pulse or switched lighting solutions are also operated with nominal current, and therefore provide the same level of brightness as continuous lighting. Using fast, opto-isolated PLC and TTL switch inputs, however, these lighting systems can be switched on at the moment of image acquisition and switched off after the image is taken. The primary advantage to using switch operation is extending the service life of the LEDs: shortening the LED duty cycle can decisively lengthen the useful life of these parts. Compared to a continuous lighting system, a system operated for only half of the power-on time can achieve a service life that is twice as long.

Pulse or switch operation is itself often confused with flash operation. In flash operation, however, the LEDs are powered on for an extremely short period of time but at a much higher level of light output. This can solve problems that arise due to extraneous light or motion blur. The special features, pros and cons, and typical applications for flash lighting will be discussed in chapter 4.2 of this Knowledge Base.

Influence of the lighting angle

Wavelengths

Optical filters

Flash vs. continuous

Fluorescence applications

Lighting systems for the reading and verification of codes

Lighting technology for shape-from-shading