
Constant Light Technology (patent pending) for LED Infrared Security Lighting

Light Emitting Diodes (LED's) generate their light output by passing a current over a semi-conductor chip "doped" with an inorganic compound to create the desired color. Infrared LED's typically use an aluminum gallium arsenide (AlGaAs) compound to generate the required output.

The Problem

A common concern when using LED based illuminators is the gradual degradation of the optical output level.

Degradation occurs naturally with all solid state light emitting devices and can be accelerated by the presence of higher ambient or operational temperatures, current density and light intensity.

As shown below, the resulting image capture will deteriorate over temperature fluctuations and time with loss of illumination quality.



Initial illumination



Degraded illumination

The optical output from a standard Infrared LED array will typically degrade by up to 10 percent within the first 5,000 operational hours. It will further reduce to approximately 80 percent of the initial light output during its life expectancy or even less depending on temperature conditions.

Figure 1 shows the typical optical output profile over time of a standard infrared illuminator. The optical output performance is for an illuminator operating in a 28°Celsius / 82° Fahrenheit ambient temperature.

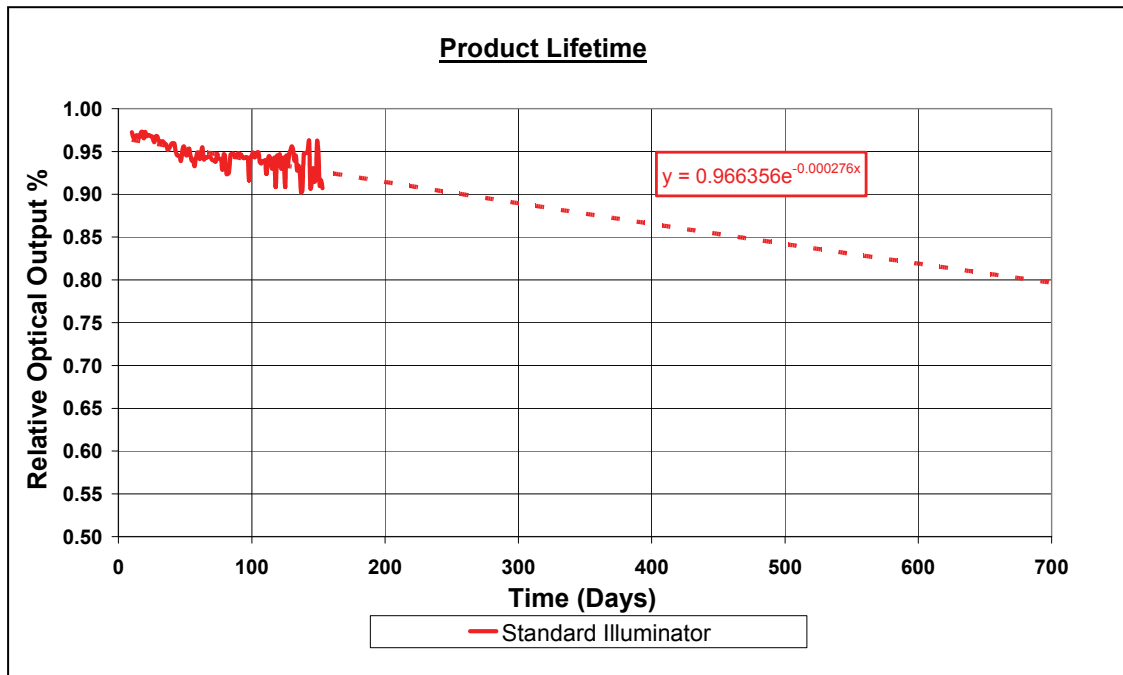


Figure 1

Optical output is affected by an increase in temperature. Figure 2 shows how output light levels can reduce by up to 30 percent when operated at 50° Celsius / 122° Fahrenheit.

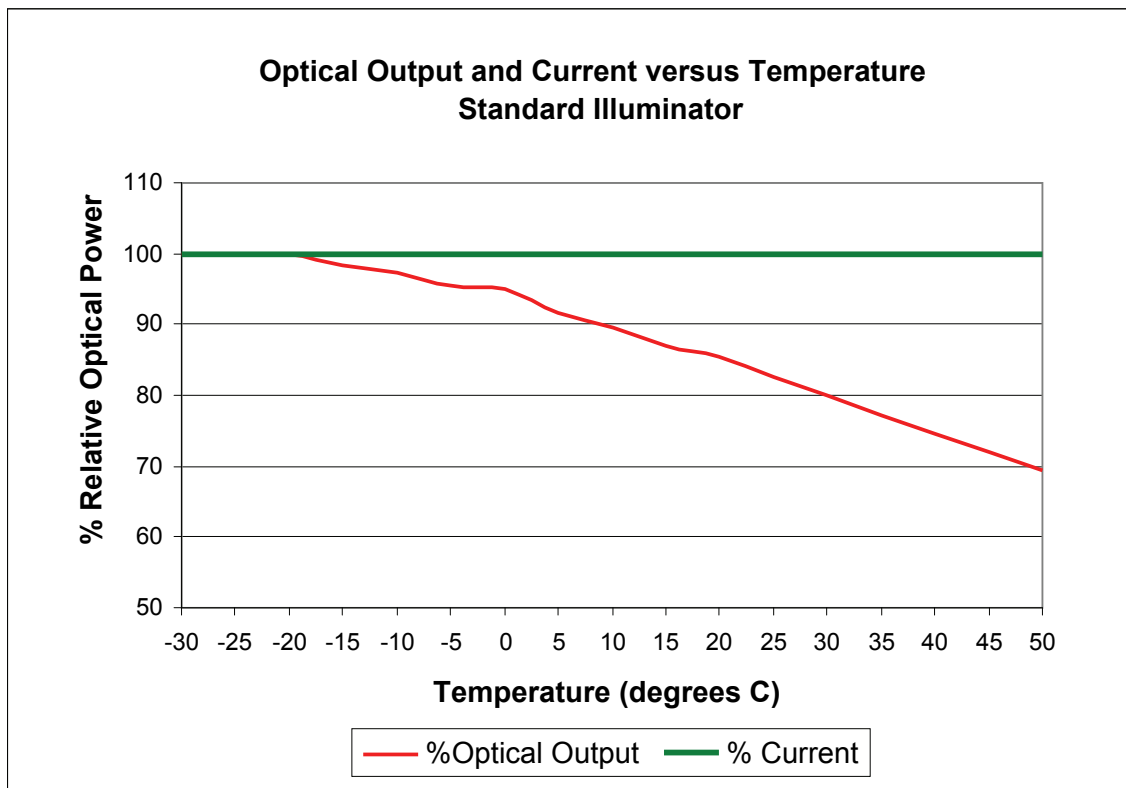


Figure 2

Degradation of the output light intensity results in:

- Reduced light at the rear of a scene
- Reduced illumination distance
- Increased image signal-noise ratio
- Increased data bandwidth

All of which drastically reduce the image quality and efficiency of any surveillance system.

The Solution

To combat this effect, Bosch Security Systems has developed **Constant Light Technology**, which maintains the optical output level throughout the life of the lamp, eliminating output variations due to LED degradation and temperature effects.

Constant Light Technology offers two major benefits for critical security video system applications:

1. The output light level remains constant throughout the lifetime of the illuminator.

Unlike traditional units, Bosch Constant Light illuminators operate by monitoring the actual output intensity of the LEDs and automatically adjusting the input power to maintain a constant light output, thus compensating for LED degradation.

Additionally, light output fluctuations caused by temperature variations are eliminated.

As a standard LED array heats up, the optical output reduces, as shown in Figure 3.

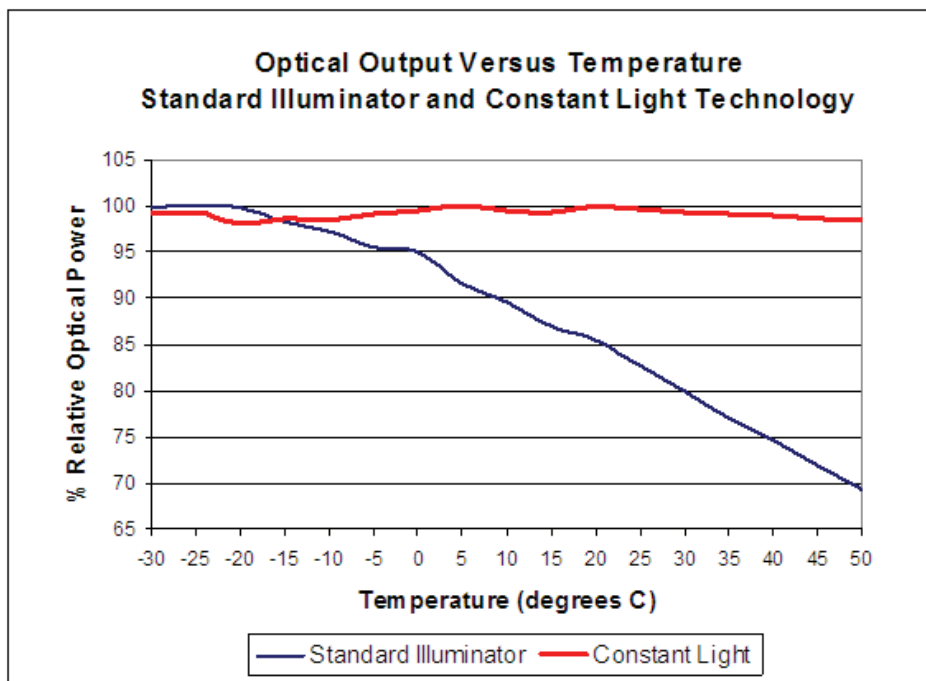


Figure 3

The light intensity monitoring device, while delivering a constant light output level, also effectively eliminates any start up delay in the output level.

2. The power consumption of the unit is optimized to the actual light level required.

A standard infrared illuminator will have a higher optical output level during its start up period (typically up to 1½ hours), while pulling a constant power before the light reduces to its specified output performance level.

A Constant Light illuminator reaches **99 percent** of its specified output level within 60 seconds and requires only **65 percent** of the maximum rated input power to achieve this as shows in Figure 4.

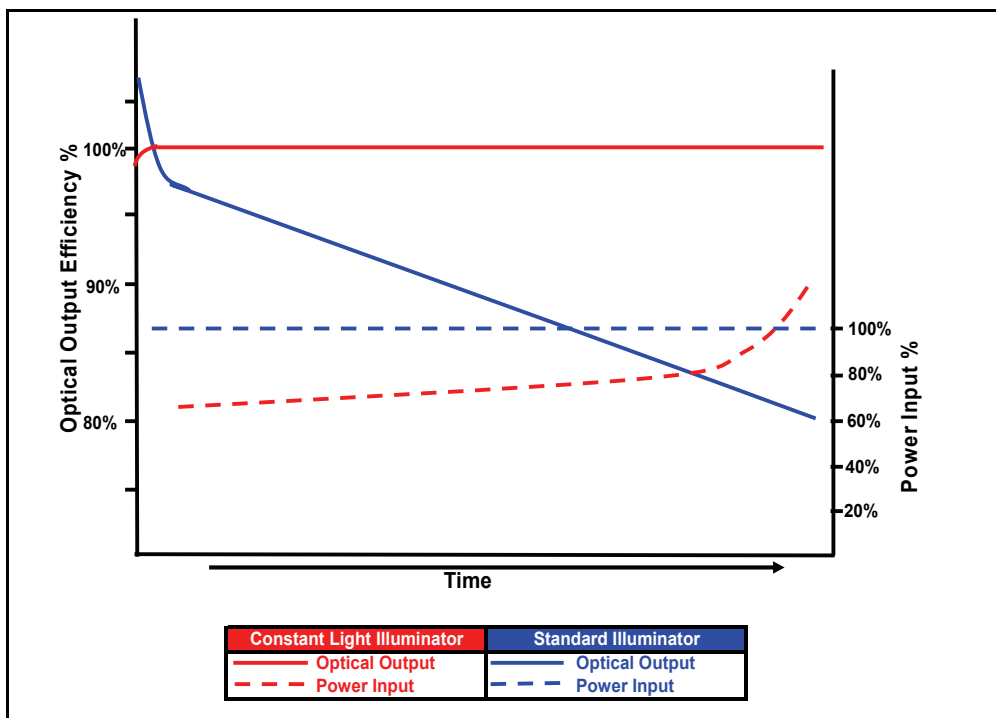


Figure 4

Less power equals less heat generated, which in turn maximizes the LED optical output and extends their life expectancy.

Most illuminators currently available on the market are designed to operate at the same fixed current for a particular model. However, due to variability in LED die quality, efficiency and lens variations, the actual optical output from unit to unit can vary dramatically. This variation can be up to +/- 20 percent in the optical output performance.

A Constant Light illuminator, however, compensates for LED and lens variations to ensure the correct level of light is delivered to the scene at all times.

Summary

Constant Light Illuminators:

- Deliver a constant light level throughout their lifetime
- Deliver a constant light level at varying temperatures
- Compensate for LED degradation
- Reduce the initial input power consumption
- Remove light output variability from similar products.

By combining patent-pending Constant Light and patented 3D Diffuser Technology, Bosch AEGIS illuminators redefine the standards for video system illumination.

Contact Bosch today to learn more about our [AEGIS infrared illuminators](#).
Speak with your Bosch representative or call 866-CCTV-REP.