Phoseon®

TargetCure™ Technology

SMART UV LED

Stable, Consistent, Precise Curing

Background

LED curing has become the new standard for the majority of UV printing solutions, in addition to enjoying rapid growth in both coating and adhesive applications. Collaboration between light source providers, materials companies, and machine builders quickly advanced LED curing capability to deliver three primary benefits: advanced capabilities, low operating economics, and environmental advantages.

An LED starts 'cold', meaning room-temperature. Like all semiconductor devices, after electrical current is applied the LED either emits light or generates heat. The cooling system in the light source, either air or water, removes the generated heat at an optimal rate ensuring maximum light output.

Air-cooled LED light sources have grown in popularity due to their simple design and lower overall system price (no need for a chiller; no water maintenance; no risk of condensation).

Air-cooled Lamp Challenges

The first challenge is stabilizing the output when the lamp is turned on. This instant-on phase typically overshoots the target irradiance by up to 20% and takes 3-5 minutes or more of operating time before it settles to the target output, commonly referred to as time to equilibrium. This potentially means over-cured material. While the unit is stabilizing, the ink, coating or adhesive is exposed to more energy than expected. This may cause the material to become brittle or have bonding issues. Also, in pinning or gelling applications, the material may be over-cured to the point that subsequent material additions do not produce the desired effect, such as matte or gloss finish or a satin coat.

The second challenge is ambient air temperature variation. Unlike water-cooled lamps, air-cooled systems use fans to move ambient air across a heat-sink that helps remove the LED heat. As warmer ambient air is blown across the heat sink, the diodes produce lower irradiance. This leads to the opposite problem; under-cured material.

The last challenge is aging. LEDs slowly lose efficiency, with typical operating times being anywhere from 20,000 to 60,000 hours of UV on-time. However, the output of that LED will not stay consistent over the entire lifetime. To a user running a specific process, it is important for them to know what output is being provided over the lifetime of the lamp. While process control using external radiometers is the best method for this, many applications preclude the use of radiometers due to size, space, or production constraints.

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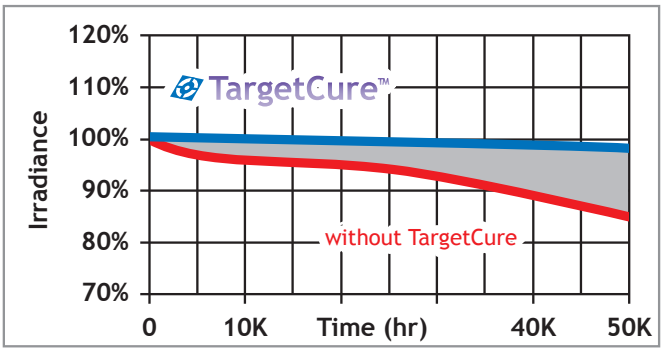
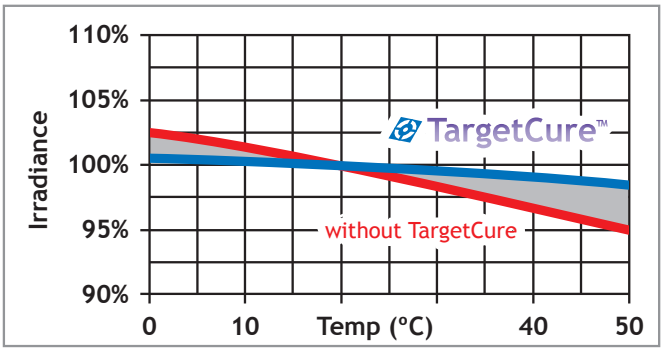
TargetCure™ Technology

Excelitas used a holistic, system's architecture approach to attack and solve the above challenges. By combining 15+ years of SLM™ LED array experience, advanced thermal management, and electronic control, the Labs developed TargetCure™ technology.

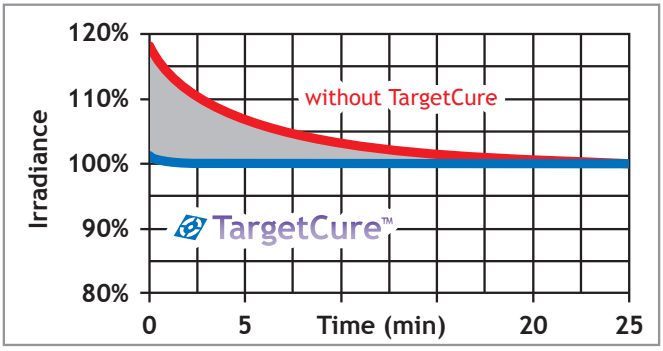
Stable TargetCure technology continually monitors the lamp's efficiency and adjusts the irradiance as the LEDs age. While the LEDs will inevitably lose efficiency (due to the pn-junction material), TargetCure technology adjusts for aging, providing users stable and consistent output.
(See Chart →)



Consistent TargetCure technology provides stable output over the product's specified ambient operating temperature. This provides stability through seasonal or even daily temperature variations. In addition, operator time is reduced as it eliminates the need to adjust intensity due to ambient environment variation.
(See Chart →)



Precise TargetCure technology eliminates overshoot and time to equilibrium by providing the target irradiance. This is especially important in scanning applications where the lamps are switched on-off as they pass back and forth across a substrate. TargetCure technology ensures the right amount of power is applied without waiting for the unit to 'equalize'.
(See Chart →)



Summary

TargetCure technology uses proprietary and patented innovations to provide users the precise and predictable UV output they demand from the market leader. TargetCure technology means reliable UV output and less monitoring of defects, thereby improving yields and profitability.

The summary benefits are as follows:

- Stable curing power over the lifetime of the unit
- Consistent curing power over range of ambient temperatures
- Precise curing power delivered when the lamp is turned on and/or cycled

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