THE POWER OF LED:

Expand your offering and increase productivity

DIGITAL PRINTING

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for more information about our featured LED printer, the powerful new EFI H1625 LED hybrid.

INTRODUCTION

LED (Light Emitting Diodes) are being integrated into all aspects of lighting. From vehicle dashboard notifications and illumination to liquid curing methods, LED is becoming a key component and a powerful player in the technology of the future.

LED conversion is a smart play in most cases. The benefit of a more efficient light source, generating less heat, less by-product and greater life span is the opportunity for significantly greater return on investment.

Whether you want the latest and greatest technology for your shop, or you want to take that rare commodity of profit and put it to its best use, LED curing is a technology you should understand.

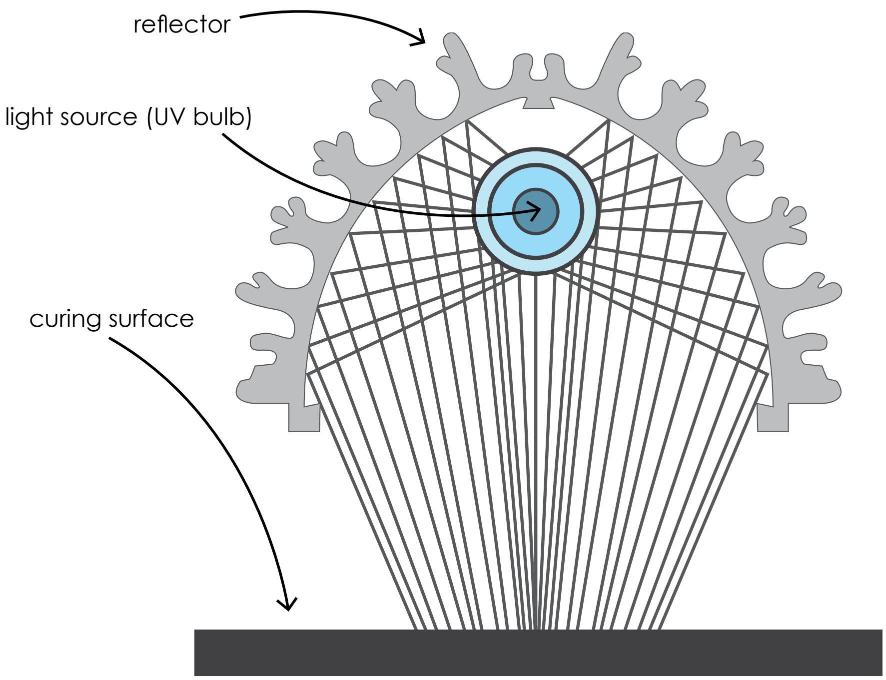
UV 101

A huge leap forward from Solvent Evaporation & Thermosetting inks, UV inks crosslink from the energy in a spectrum of light. The list of benefits is long and familiar to most printers (plus it's one step closer to a light saber). Just to name a few:

- 100% solids
- Low VOC
- Instant cure (with the exception of Cationic Systems)
- Lower ink cost per square foot
- Smaller footprint
- Less dot gain
- Less substrate distortion
- Adhesion to a wide range of substrates

Some of the challenges the early adopters faced include:

- While UV dramatically decreased VOC's, it added ozone which needs to be evacuated. Noise and increased electrical needs added another fail point in the process.
- Spectral output, created by the metal in the bulb and the fuel that fires the plasma discharge, depletes. Because of this, the output ramps downward and is in a constant need of measuring.
- Managing heat was a challenge and resulted in unseen profit being evacuated out of the building.

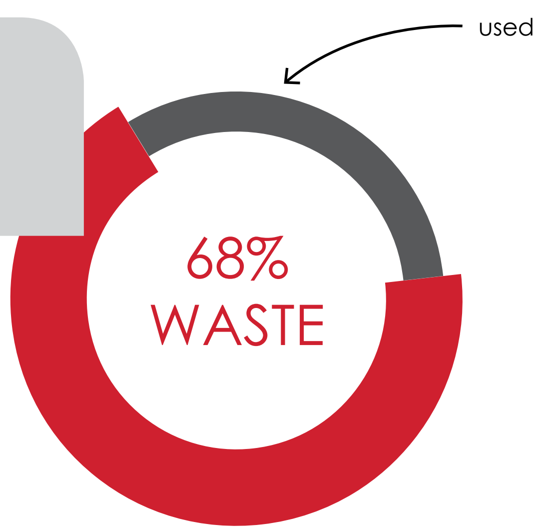


UV Curing Assembly Diagram

Typical construction of a UV curing assembly consists of a bulb, reflector and, in digital printers, a shutter door. Since the bulb emits light in a 360 degree pattern, a reflector is needed to capture output and focus it to the curing surface to maximize the output energy. Reflectors do not filter so the full spectrum of light produced, including those in the IR range (heat), is focused as well. Ozone produced from the bulb and radiant heat are evacuated through large blowers integrated in the system.

Traditional UV bulbs output a wide range of wavelengths outside what is needed for cross linking the ink film. The unused wavelengths still take energy to produce, hence wasted energy, excessive heat and the cost to produce it.

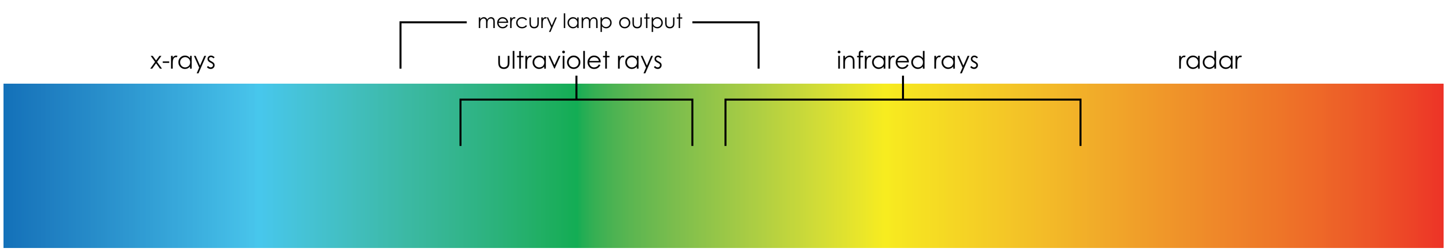
Approximately 68% of UV waves produced during the curing process are unused, leaving only 32% as productive output.



LED IMPROVES THE PROCESS

By narrowing the range of wavelengths to those that react with the Photoinitiator to cure the ink film (395nm), we reduce heat and power consumption.

The spectrum of light produced with traditional UV includes wavelengths in the infrared part of the light spectrum, which is where the heat is generated. The heat generated by conventional UV bulbs cause the print substrate to deform. This deformation can be as slight as small dimensional changes or as severe as making the substrate un-printable. In digital printing the most hazardous deformation can cause head strikes, potentially damaging your print mechanism.



Common problems associated with UV curing that LED avoids:

- Double-sided printing – difficulty aligning face and reverse
- Single-sided printing – curling
- Mounting or other finishing – shrinkage
- Post print handling – poor rewind, telescoping on take-up
- Substrate selection – reduced library due to heat sensitivity

LED diodes emit light via flow of electrons, a process called electroluminescence. Traditional UV bulbs use a fuel based chemical reaction to generate light that will degrade over time impacting it spectral output. Considerably less energy is required to maintain an LED electron flow verses maintaining a chemical reaction.

Beyond the substrate, the UV bulb and housing must stay within an operating temperature range and must be cooled. Cooling is also associated with the need to evacuate ozone produced by the degradation of the chemical fuel. The need for this process is greatly decreased with the use of LED. In addition to this benefit, LED also reduces the noise level that is associated with the cooling and ventilation process that UV needs to operate.

NO SHORTAGE OF SAVINGS WITH LED

Another positive characteristic of LED is “instant on”, unlike conventional UV which requires warm-up time and shutters to contain the light during warm-up. Warm-up is lost time. Lost time is lost money.

Light leakage from faulty operation of the shudder can cause heat buildup on the substrate and potentially even cure ink in the print head resulting in damage. With this level of control and no need for a fuel conversion, the life span of the LED bulb is rated for up to 10 times longer than conventional UV bulbs.

SUMMARY

Up to 70 percent savings in electrical cost, wider range of substrate and increased uptime, all add up to a solid investment. LED is the next step in UV curing and is rapidly becoming integrated into print platforms of all shapes and sizes. LED print technology is nothing short of powerful.

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glossary

Wavelength: In physics, the wavelength of a sinusoidal wave is the spatial period of the wave—the distance over which the wave’s shape repeats. It is usually determined by considering the distance between consecutive corresponding points of the same phase, such as crests, troughs, or zero crossings, and is a characteristic of both traveling waves and standing waves, as well as other spatial wave patterns.

Light Spectrum: The electromagnetic spectrum is the range of all possible frequencies of electromagnetic radiation. The “electromagnetic spectrum” of an object has a different meaning, and is instead the characteristic distribution of electromagnetic radiation emitted or absorbed by that particular object. The electromagnetic spectrum extends from below the low frequencies used for modern radio communication to gamma radiation at the short-wavelength (high-frequency) end, thereby covering wavelengths from thousands of kilometers down to a fraction of the size of an atom.

Reflector: A curved surface with a mirror like surface used in conjunction with a light source to focus the light produced to a point or narrow beam.

Photoinitiator: A photoinitiator is any chemical compound that decomposes into free radicals when exposed to light. Photoinitiators are found both in nature (in photochemical smog) and in industry (for example, in plastics production).

Monomer: A monomer, (from Greek mono “one” and meros “part”) is a molecule that may bind chemically to other molecules to form a polymer.

Oligomer: In chemistry an oligomer (\ə-'li-gə-mər\, or oligos, is Greek for “a few”) is a molecular complex that consists of a few monomer units, in contrast to a polymer that, at least in principle, consists of a nearly unlimited number of monomers.

Polymer: A polymer is a large molecule, or macromolecule, composed of many repeated subunits, known as monomers. Because of their broad range of properties, both synthetic and natural polymers play an essential and ubiquitous role in everyday life.

Deformation: In materials science deformation is a change in the shape or size of an object due to an applied force (the deformation energy in this case is transferred through work) or a change in temperature (the deformation energy in this case is transferred through heat).

Electroluminescence: An optical phenomenon and electrical phenomenon in which a material emits light in response to the passage of an electric current or to a strong electric field.

about us

NAZDAR SOURCEONE

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