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FLINT GROUP WHITEPAPER

Putting LED Curing in the Spotlight
Flint Group and EkoCure®

FlintGroup

1.1 Introduction

The global print and packaging industry is known for being visionary and possessing an innate ability to adapt and change.

The sector must respond to changing consumer needs and market conditions. Over the last decade, this has meant an ever-sharper focus on sustainability and reducing the environmental impact of business - a core component of commercial success that no business can afford to ignore.

One of the most significant innovations in the printing industry can be found in curing methods, with LED (Light-Emitting Diode) curing slowly emerging as a superior alternative to traditional UV (Ultraviolet) curing - now outperforming it in many respects.

Both mercury lamps and LED lamps are used in curing systems for UV inks. However, they operate at different wavelengths. Mercury lamps produce UV light in a broad spectrum, while LED lamps emit UV light at specific wavelengths.

In the following document, Flint Group explores why LED curing is proving to be the future of printing success, where the much-touted sustainability benefits come from, and how printers can remain productive, cost effective and competitive through this transitionary period.

2.1 In a New Light: Exploring the rise of LED-based systems in printing

For many years, UV curing has been a staple of printing, but change is on the horizon. There is a marked decline in printers purchasing new mercury curing systems, but a significant upswing in LED-based systems.

The traditional UV curing technique relies on using mercury arc lamps in combination with light curable materials and inks; however, a number of important market forces and technological limitations are making traditional UV technologies steadily more obsolete.

2.2 Power consumption and the drive for cost control

As energy costs continue to rise, printers are exploring alternative systems that can operate effectively with less demand on power.

An LED-based system has the potential to reduce power consumption by up to 80% in comparison to a high-intensity UV lamp with a mercury arc bulb.

In addition to reduced and more easily controlled costs in operation, LED lamps have no warm-up time and can be turned on and off instantly, resulting in substantial energy savings during day-to-day production cycles.

2.3 Environmental Hazards of Mercury

Mercury, found in the mercury arc bulbs used in UV curing, is a hazardous environmental toxin, and poses significant ecological and health risks. In addition to carrying risk with their day-to-day use and handling, this also means they are very difficult to dispose of at the end of their service life.

As a result, there are programmes intended to more closely regulate the use and sale of mercury with a view to eventually phasing it out altogether, which will make UV lamps harder to acquire for printers and converters.

One of the most well-publicised to date is the Minamata Convention. Named after the Japanese city that faced a tragic incident of mercury poisoning in the 1950s, the convention was adopted in 2013, coming into force in 2017.

The convention sets the framework for global efforts to reduce and ultimately eliminate the use of mercury in various industries, and focuses on controlling mercury supply, reducing mercury emissions, and ensuring the safe storage and disposal of mercury-containing waste.

2.4 Cost and Waste Reduction

UV curing systems require frequent maintenance and bulb replacements to remain productive, typically lasting between 1,000-2,000 hours. While UV has been a staple of printing for a long time, this is no longer sufficient for high-volume, high-performance printers and converters.

By contrast, LED curing units have a tested and proven life span of more than 50,000 hours on line, resulting in reduced waste, lower replacement costs, and dramatically reduced equipment downtime.

With instant start and stop operation, the efficiency of LED lamps bring an operational life time that is in line with any conventional printing press, for exceptional synergy when the press is printing.

The longevity of LED units, coupled with their consistent frequency and intensity of output, improves curing consistency, reduces the risk of errors through production, and enhances overall cost-effectiveness.

3.1 The subsequent rise of LED

Where UV curing methods are proving more complex and costly in today's market, LED curing technology emerged to fill the gap. The technology has undergone significant advancements, addressing previous barriers to its widespread adoption.

Over the course of around a decade, improvements in LED efficiency, output power, and thermal management, have paved the way for its successful integration into the printing industry. The growing market for LED curing, combined with increased investment and improved yields, has also contributed to the decline in overall costs, making the technology more affordable than ever before.

3.2 Sustainability Benefits and Energy Use

LED curing offers various sustainability benefits, making it an attractive choice for businesses aiming to minimise their environmental impact, without sacrificing performance.

LED curing brings reduced carbon impact over other UV curing methods. The instant on-off capability of LED lamps, compared to mercury based systems, further enhances energy savings. With LED technology, the inherent risks associated with mercury are also eliminated.

In combination, these advantages align with global efforts to mitigate climate change and promote sustainable manufacturing practices.

LED curing systems consume significantly less energy compared to mercury curing systems. Through efficient on-off cycles, LED lamps can achieve power savings of up to 80% compared to mercury UV lamps.

With rising interest in the use of LED in packaging applications, studies are commencing on the energy savings that may be possible when comparing LED to other drying techniques, such as hot air, IR lamps, or a combination. Initial observation suggests that these energy savings could be very high.

Naturally, these energy savings result in substantial cost reductions for manufacturers, reducing electricity bills and minimising the need for additional infrastructure to support high-energy UV curing systems.

3.3 Environmental Impact and Cost

LED systems promote sustainability and create a safer work environment by eliminating mercury from the curing process.

The absence of mercury reduces the risk of exposing print operators to toxic substances, protecting both employees and local ecological systems. LED curing also reduces the generation of ozone from lamps in operation, eliminating the need for dedicated ozone extraction equipment.

These environmental benefits align with international regulations such as the aforementioned Minamata Convention, and support the overall goal of sustainable manufacturing.

Additionally, across the board, LED curing systems offer significant cost savings over time. The reduced energy consumption and elimination of bulb replacements result in lower operational costs. Additionally, the longevity and consistent performance of LED units improve productivity, reduce downtime, and minimise material waste.

These cost and efficiency advantages make LED curing an attractive investment for printers seeking long-term sustainability and profitability.

Our own exploration with print customers reveals a fantastic suite of benefits.

Observed Reliablity/Stability/Operations	Customer Feedback
LED lamp failures	Zero
LED start time	Instantaneous
Maintenance Time Reduction	>50 - 75% less
Increased material stability	certain unsupported films
Press Availablility (making salable product)	8 - 15% increase
Ozone reduction	100% reduced
Quality of cure	across the board improvement
System temperature	from 350°C to 60°C
Measured lamp degradation over 4 years	less than 5%

Repeatedly reported from customers running LED inks over the last 8 years

4.1 EkoCure® – LED transition made simple

Despite being central to production workflows, the switch from UV to LED curing can be a gradual process, with minimal disruption and cost for printers.
Therefore, there is enormous value in Dual Cure technologies, such as those found in the EkoCure® ink line.

Designed to work under both UV and LED curing systems, these technologies enable printers to use the same ink across methods, providing flexibility and compatibility during the switch.

Displaying Flint Group expertise at its finest, EkoCure® is the culmination of almost a decade of LED ink development experience.

Its Dual Cure structure allows printers to adopt LED curing unit by unit, minimising waste, disruption and excess costs associated with a sudden system-wide replacement.

As a result, printers can strategically upgrade their equipment, gradually phasing out UV curing systems and integrating LED curing units where it makes the most economic sense. This approach ensures a smooth transition, reduces financial strain, and optimises resource utilisation.

By utilising Dual Cure technologies like EkoCure®, printers can maximise the sustainability benefits of LED curing without compromising on performance or quality. These technologies enable printers to achieve superior curing results while minimising their environmental impact. The ability to switch between UV and LED curing methods with the same ink line provides printers with the flexibility to adapt to different customer requirements and market demands rapidly, and ahead of the competition.

As one of the most experienced technical teams found in the printing consumables sector, Flint Group's experts have developed a unique combination of photo-initiators and binders that allow the ink to cross-link from top to bottom. This enables a full high-quality and consistent cure when exposed to the UV wavelengths from either Mercury or LED lamps.

The result is a range of inks and coatings, with the on-press performance of all Flint Group products that work seamlessly with both mercury-based UV curing lamps that printers may still be using, and low-energy LED curing lamps that are steadily taking their place.

EkoCure® F

EkoCure® ANCORA

EkoCure® ANCORA F2

Learn more about the EkoCure Range

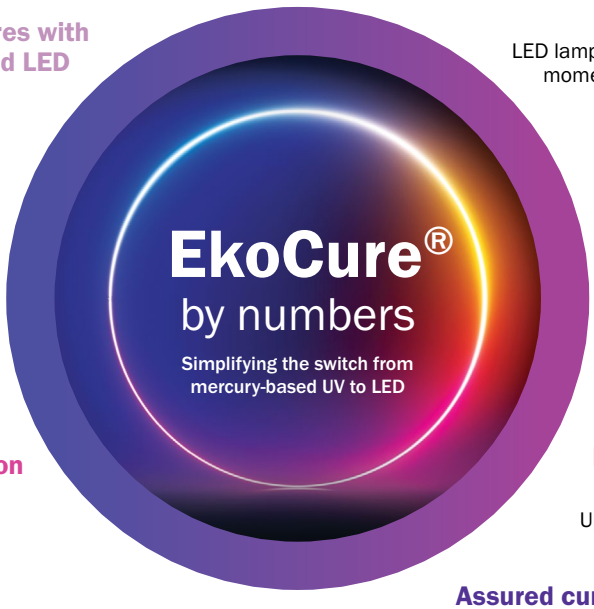
	EkoCure® F	EkoCure® ANCORA	EkoCure® ANCORA F2
FCM / Food contact	NO	YES	
DualCure / LED & Mercury	YES	YES	YES
Low Viscosity	● ● ●	● ●	● ● ●
Curing Speed	● ● ●	● ● ●	● ●
Colour Strength	● ● ●	● ● ●	● ● ●
Full range	● ● ●	● ●	● ● ●
Press performance	● ● ●	● ● ●	● ● ●
Adhesion	● ● ●	● ● ●	● ● ●

● ● ● **Excellent** ● ● **Good** ● **Limited use**

For more information on how the Flint Group team can assist you in making the switch to LED, contact **info.narrowweb@flintgrp.com**

FlintGroup

10+ years of LED curing ink technology leadership



EkoCure®cures with both UV and LED

Switch presses easily – unit by unit

One ink inventory for all print needs

Up to 80% reduction in energy use

CO_2 Low Carbon Footprint

Instant on-off
LED lamps reaching full capacity the moment they are switched on

LED lamps lasting the lifetime of the printing press
- no lamp replacement needed

Up to 75% reduction in maintenance
- No cleaning of reflectors
- No ozone to be removed
- No blowers • No venting • Less noise

Reduced downtime press availability
Up to 15% more productivity

Assured cure performance
No lamp or reflector changes every 1000 hours

Premium print quality performance

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