Flexo platemaking: comparative analysis confirms UV LED outperforms conventional exposure.

Why Esko XPS Crystal delivers more consistent flexo plates for enhanced print performance than conventional exposure frame technologies

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ESKO

Introduction

The flexo industry is innovating fast. If you want to keep up you need research into the newest developments. Esko, global supplier of innovative hardware and software solutions for the print and packaging sector, recently conducted a series of comparative tests for the Esko XPS Crystal plate exposure system, in order to validate its technology claim of being able to create the world's most consistent flexographic plates.

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Background

Conventional exposure frames use fluorescent bulbs to output ultraviolet light to expose photopolymer flexographic printing plates. In order to increase processing speed and efficiency, new systems have emerged in recent years promoting the use of high intensity bulbs, with the philosophy that transferring more energy to the plate, over a shorter duration in the exposure frame, is the route to increased plate productivity and consistency.

Esko launched its XPS Crystal exposure unit in 2016 promoting a new method of plate exposure: the use of a narrow array of light emitting diodes (LED) to output high intensity UV light, as opposed to a whole plate being exposed at once.

In the Esko XPS Crystal design, the LED array passes over the surface of the plate at a constant speed. This avoids the need for a warm up period and eradicates the risk of dot cupping through inconsistent and/or overexposure of the plate.

LED arrays do not degrade like fluorescent bulbs; the latter typically have a 30% degradation in light over 1000h, resulting in the need for bulb replacement and unstable plate production.

A typical LED set up has no degradation over time and an expected lifetime of over 5000h enabling perfectly controlled plate production. LED is a cool light minimising heat distribution to the plate, as well as shaping uniform dots across the plate. This is in contrast to fluorescent bulbs where the quality of the light emission varies from lamp to lamp.

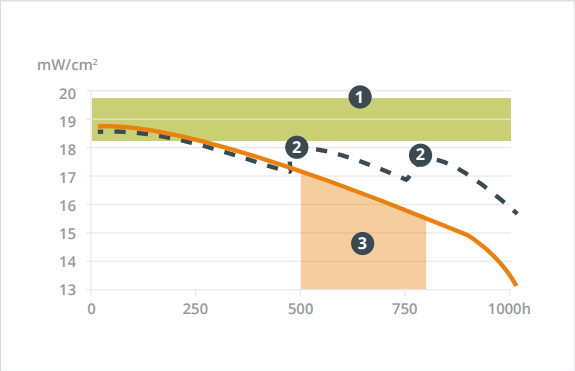
Testing Regime

To explore the relative benefits of the exposure frame technology design, Esko conducted a series of comparative tests with conventional exposure (CE) and cold conventional exposure (CCE) frame designs to compare and contrast the Esko XPS Crystal performance.

Should the Esko XPS Crystal unit provide a more consistent exposure method, it should demonstrate less measurable variance with regard to the caliper of the floor and the size of dots created across the full tonal range.

In order to ensure the consistency of analyses, preliminary tests were conducted to:

- Ensure the correct processing time for each exposure device was identified
- The correct minimum dot value for each exposure type was verified
- The ambient resting temperature of each exposure frame was confirmed, in order to set the temperature point for cold conventional exposures



Banklight table bulbs vs UV LEDs
1. Plate adjustable Digital UV level
2. Lifetime extension by increasing exposure time
3. Typical lamp exchange

Analyses & Results

Plate Floor & Relief Testing

In terms of floor measurements and relief testing assessments, the study demonstrated that the three exposure settings involved were incapable of producing a plate with the same (consistent) floor measurement. However, the Esko XPS Crystal demonstrated the most consistent plate.

	CCE	CE	XPS
Average	0.0424	0.0444	0.0482
Max	0.0447	0.0462	0.0493
Min	0.0400	0.0421	0.0472
Range	0.0048	0.0042	0.0021
Standard Deviation	0.0017	0.0015	0.0005

Fig.1.1 Combined Average Floor Measurements (in)

The cold conventional exposure required more time to achieve the same floor depth and created floors with less depth than conventional exposures (0.002" less) indicating the importance of pre-warming bulbs.

In a 50 x 80 plate, the conventional exposures had at least a 200% greater range and a standard deviation of floor measurements 3 times that of the XPS exposure frame.

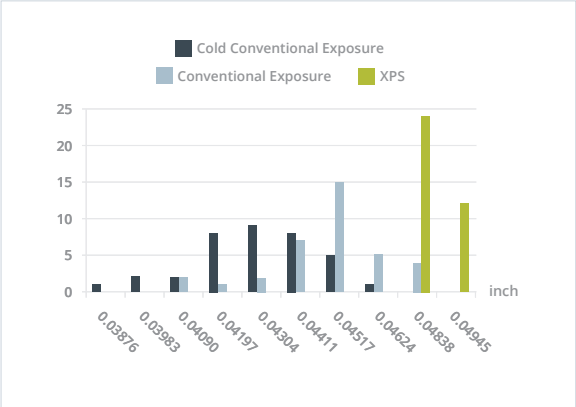


Fig 1.2 Histogram of Floor Measurements (in)

In addition, the Esko XPS unit demonstrated less variance in floor measurement, even when compared with a brand new conventional exposure frame.

The XPS exposure has a much steeper distribution demonstrating its difference in range and standard deviation.

With respect to dot formation, the XPS exposure frame was able to create smaller viable printing dots on a plate, when compared with conventional exposure.

The table indicates the average results of the measurements and the linear response of the plates.

In any realistic production environment, it would be recommended that any plate would have an additional curve applied to it to manage tonal value increases on press. Consequently, all of the above values, excluding the minimum dot, would be adjusted and managed accordingly in the production environment.

	CCE	CE	XPS
Min	1.178	1.204	1.006
25%	16.274	16.249	23.323
50%	37.981	37.840	46.357
75%	63.852	63.737	71.767

Fig. 1.3 Average Dot Measurement of Full Plate

It is observed that the CCE and CE plates measured an average of 10,7% below linear, while the XPS plates measured an average of only 3% below linear.

The standard deviation was calculated from all 36 measurements of a full plate and averaged across replicates to give a single reading.

At each point in the tonal scale, the Esko XPS exposed plate was at least half the variance of the conventionally exposed plates.

At the minimum dot, the XPS plate had a standard deviation of 0.05%, when the CE was 0.14% and CEE 0.13%. This demonstrated the higher consistency of the XPS exposed plate.

This chart indicates the reduction in range achieved by the Esko XPS Crystal.

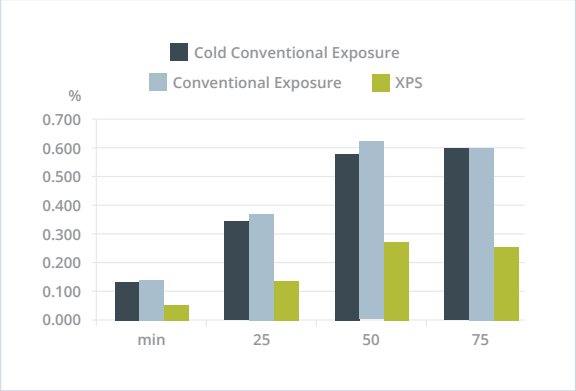


Figure 1.4 Average range of Betaflex Measurements of Full Plates

Particularly at the minimum dot, there was not a wide range of measurements with the XPS exposed plates. The Esko XPS had an average range 0.19% while the range of the competitive plates were wider at CE 0.59% and CCE 0.71% respectively.

Resampling needed to be carried out for 1 in 3 tests. However, XPS exposed plates never had to be resampled as the software was able to detect enough definition on the first attempt to correctly identify the printing dots each time.

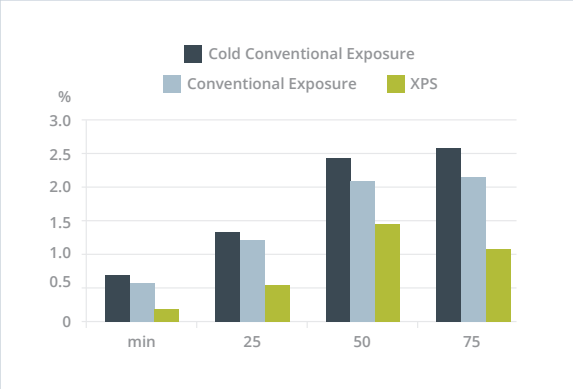


Fig. 1.5 Average Standard Deviation of Betaflex Measurements of Full Plates

Conclusions

Based on this comparative analysis of Conventional Exposure and Cold Conventional Exposure with Esko Crystal XPS exposed plates, it is clearly demonstrated that the XPS unit produces a more uniform flexographic plate and the highlight dot areas in particular are more uniform and well defined, thereby delivering improved plate quality and consistency for Esko customers.

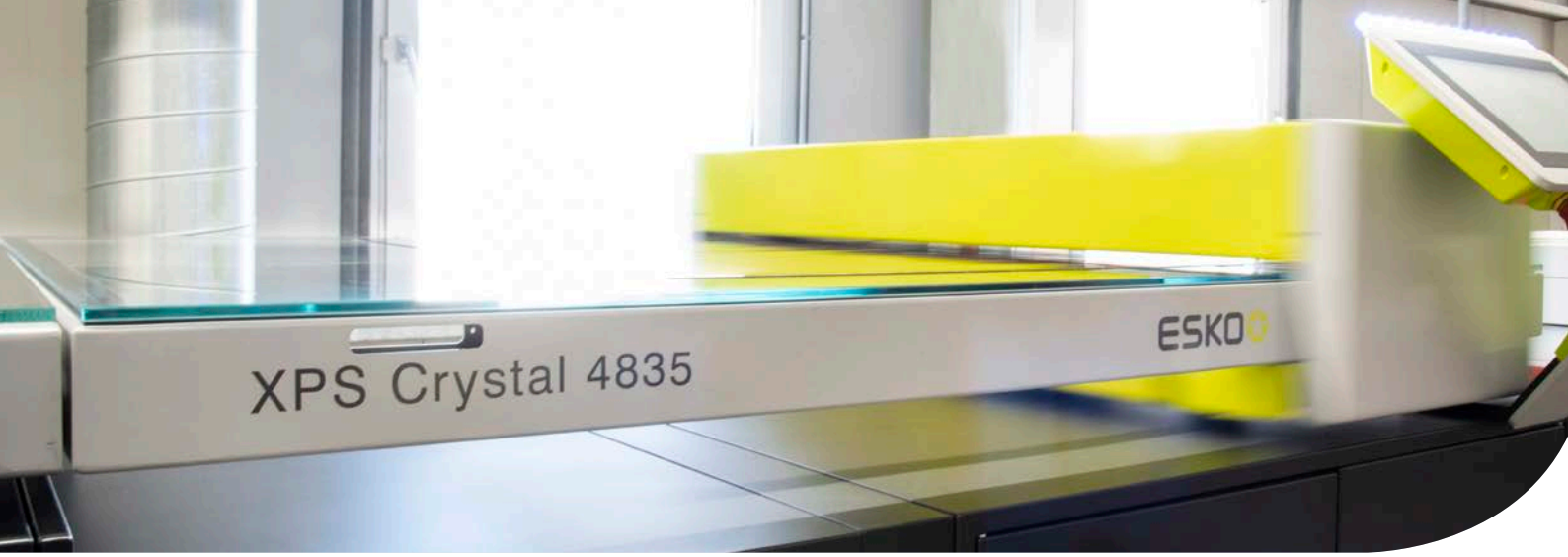
With the many variables that need to be controlled in flexographic printing, receiving consistent high quality plates enables printers to focus on overall process optimization and asset utilization rather that simply controlling quality day to day.

A good example of these benefits can be seen with multinational packaging and labels supplier, All4labels - Global Packaging Group. Utilizing Esko XPS plates, the company observed that jobs came up to color immediately resulting in a reduction in start up waste. They also experienced perfect print consistency, where all step-and-repeated labels were printing out equally across and along the web (left to right and top to bottom).

This even holds true on 175dpi **enabling spot colors being to be built up out of fixed colour palette printing,** resulting in less manual intervention on press which improved operational efficiency. In fact, a press could be left unattended for up to 60,000m, rather than having to intervene every few thousand metres for alignment and cleaning. The ultimate impact to the business was an improvement in press uptime creating an increase in overall capacity.

With printers seeking to reduce costs and increase capacity without having to invest in new presses or headcount, it is clear that Esko Crystal XPS delivers a new level of flexographic plate performance.

To find out more about Esko Crystal state-of-the-art flexo plate making solutions, please visit **www.esko.com**



About Esko

Esko, a Danaher company, is a global provider of integrated software and hardware solutions that digitize, automate and connect the go-to-market process of consumer goods. Esko connects people, processes and tools to meet the needs of global brands and the people who trust them.

Esko customers bring consumer products to life with accuracy, efficiency and speed. Packaging for 9 out of 10 major brands is produced by Esko customers today. Headquartered in Gent, Belgium, Esko employs 1800 people worldwide with a unique focus on the packaging sector.

To find out more, please visit **www.esko.com**

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