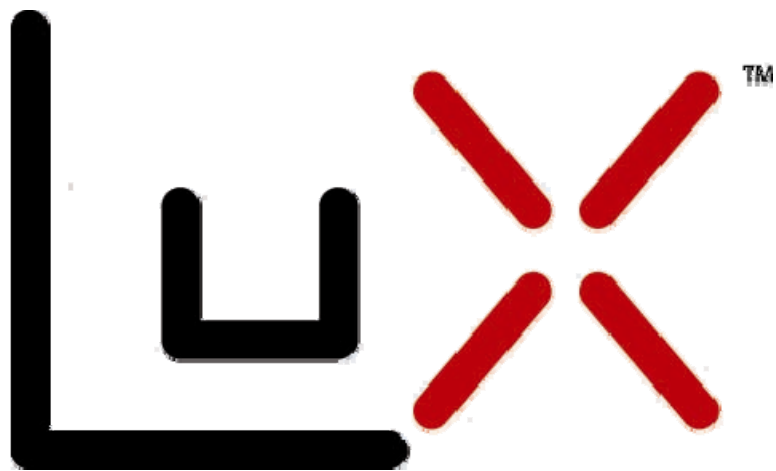


The Effect of MacDermid LUX™ on the Solid Ink Density Enhancement of EskoArtworks MicroCell Surface Patterning Technology



EXECUTIVE SUMMARY

LUX is a digital flexo plate imaging technology from MacDermid Printing Solutions that offers improved quality, consistency, and versatility to both flexo printers and platemakers. It creates a flexo dot with an optimized dot shape and print capabilities while retaining your existing digital plate workflow.

MicroCell is a digital flexo plate surface patterning technology recently introduced by EskoArtworks. It improves solid ink density (SID) and ink laydown in solvent ink on film print applications, giving more vibrant colors and an expanded color gamut.

These two technologies both offer significant advantages to those interested in higher quality flexo printing. But their interaction was not quantitatively known until now. A print trial was conducted at Fox Valley Technical College in Appleton, Wisconsin to answer the questions:

1. Will LUX make my MicroCell better?
2. Can LUX+MicroCell achieve higher SID than MicroCell alone?

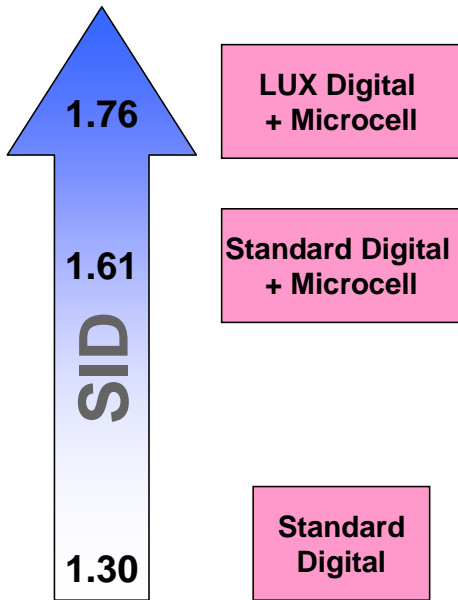
The answer to both questions was clearly shown to be **'Yes'**.

MicroCell significantly raised the SID of standard Digital MAX plates, from 1.30 to a maximum of 1.61, demonstrating the value of the technology for improving print quality and color gamut.

But as good as MicroCell was, LUX made it even better, raising the maximum SID obtained to 1.76, a 35% increase over the standard digital plate and a 9% increase over the best MicroCell result.

Perhaps even more impressive was the finding that LUX increased the process window for MicroCell as well as the maximum SID achieved. Of the 32 MicroCell patterns tested on the standard digital plate, 15 gave better SID than the control. With the LUX digital plate, 22 of the patterns gave improvement, and 10 of these gave a higher SID than MicroCell alone could achieve.

Simply put, LUX makes EskoArtworks' MicroCell *print better*.



INTRODUCTION

As part of their HD 2.0 (4000dpi) imaging upgrade for their digital flexo plate imagers¹, EskoArtworks introduced MicroCell, a surface patterning technology intended to enhance solid ink density (SID) and ink laydown. The MicroCell technology has been very well-received by most plate manufacturers², and has been shown to offer clear benefits in the smoothness of ink laydown. Reductions in pinholing in solids, improved color trapping, and increased SID overall are cited as benefits of the technology.

While the positive effects of the MicroCell technology were clear, what was less certain was how LUX would interact with MicroCell. Because MicroCell relies on very high line screen (600+ lpi) patterns added to solids and tones, and LUX has been shown to radically enhance the sharpness of reverses in digital plates, it seems reasonable to assume that LUX would improve the fidelity of the MicroCell patterns in the finished plate. But the real value of MicroCell (and LUX) comes from print performance, so the fundamental question to address is “Does LUX makes MicroCell print better?”

1.1 Print Testing

Testing of MicroCell on LUX digital and standard digital versions of MacDermid's Digital MAX 60 durometer plate were conducted in early 2011 at Fox Valley Technical College³.

Digital MAX .067"/1.70 mm plates were imaged on an Esko Advance imager with HighRes optics and the HD 2.0 software package. LUX was used with selected plates, using MacDermid's

¹ EskoArtworks press release, Sept 10, 2010, “EskoArtwork makes the best flexo plate imaging even better”, <http://www.esko.com/web/site.aspx?p=54&PressReleaseID=1722>

² a) Cyrel: http://www2.dupont.com/Packaging_Graphics/en_US/products/HD_flexo.html, b) Flint Group: 2011 FPPA presentation “Making the Grade”

³ See <http://www.fvtc.edu/public/content.aspx?ID=1308&PID=44>

LUX laminator and Membrane 100. The test image incorporated 32 separate MicroCell patterns in 4x5 cm patches, along with a control solid patch with no screening applied. Plates were printed with 1320 stickyback, a standard choice for a hard digital plate.

The substrate printed was opaque white polyethylene, using Sun Chemicals solvent-based cyan ink on FVTC's PCMC Avanti 8 color CI press. Anilox were Harper 800 lpi 2.0 bcm.

Readings of each screening condition were taken as averages of three separate print repeats, repeats collected after an X minute run-in period for each plate.

DISCUSSION

The 1:1 imaging characteristics of LUX technology are well-documented. However, they are usually cited in reference to the unique dot shape that LUX achieves and its related print benefits. What is sometimes less appreciated is that this imaging fidelity affects positive and negative type and reverses, creating a sharper definition of these graphic elements, a more robust support structure, and deeper reverses overall.

1.2 Solid Ink Density Effects

There were 32 separate MicroCell patterns print tested, in order to allow comparison both of LUX vs standard performance for a given MicroCell variant and to determine what variant offered the highest possible SID overall. Thus, we were able to answer two questions:

1. Will LUX make my MicroCell better?
2. Can LUX+MicroCell achieve higher SID than MicroCell alone?

1.2.1 Control SID

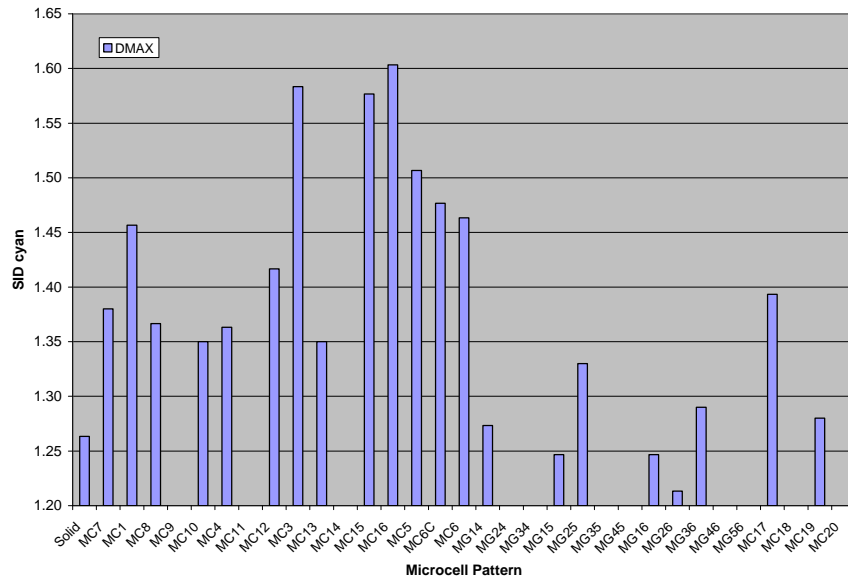
The standard digital MAX plate solid produced an SID of 1.26, while the LUX version of the same plate gave a reading of 1.30. The 0.04 density difference is not statistically significant, nor is it large enough to be visually detectable. From this, it was concluded that LUX did not, by itself, improve the SID of solid print performance of Digital MAX.

1.2.2 MicroCell Effects on a Standard Digital Plate

As shown in the chart below, many MicroCell variants had a significant effect on SID. Only those MicroCell patterns that improved SID are shown; the missing bars in the graph indicate that 11 of the 32 MicroCell patterns had lower SID than the control solid.

Of the remaining 21 patterns, 6 had SIDs that were statistically indistinguishable from the control. The remaining 15 patterns had SID significantly higher than the control, and four of them had SIDs over 1.50, a greater than 20% increase in SID. The maximum SID obtained came from pattern MC16 at 1.61, which is a 28% increase over the control solid. This would be visibly striking to the naked eye, and is an excellent illustration of why the MicroCell technology has been so warmly welcomed by the flexo printing industry.

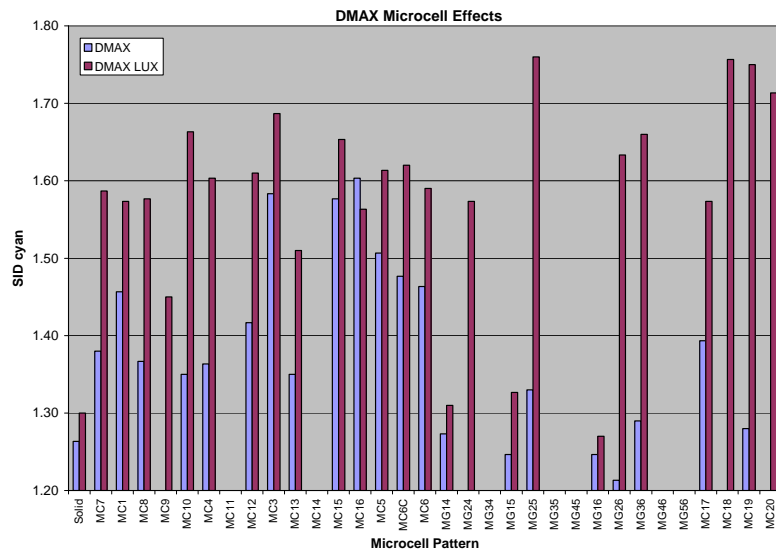
1.2.3



MicroCell Effects on a LUX Digital Plate

The effect of LUX on MicroCell performance was dramatic and uniformly positive, as shown by the following chart. There were 22 LUX+MicroCell variants that had significantly higher SID than the control solid. There were 7 LUX+MicroCell variants that had SIDs lower than the control. There were only 3 variants in which the MicroCell-LUX combination was statistically indistinguishable from the control. There was only a single LUX+MicroCell variant (MC15) where LUX did not improve the SID over the standard digital MicroCell, and in this case the standard and LUX versions were statistically indistinguishable.

Even more impressively, LUX raised the maximum SID achievable from 1.61 to 1.76, a 9% boost from the best SID without LUX and a 35% SID increase compared to the control solid. Fully 9 of the MicroCell-LUX variants gave a higher SID than the maximum achieved by the best MicroCell variant in standard digital plate format. Plus, 4 of the MicroCell variants that gave lower SID than control in standard digital plates improved drastically, yielding much higher SID than control once treated with LUX.



1.2.4 Impact on MicroCell ‘Window’

As the table below shows, not only did LUX improve the maximum SID possible, it increased the operating ‘window’ for MicroCell, making more variants work than did in standard digital format. In practice, this could mean less testing would be required to find the best MicroCell pattern and to maintain the SID improvement that MicroCell offers the flexo printer.

SID (relative to control solid)	Number of MicroCell variants	
	Standard Digital	LUX Digital
Lower	11	7
Same	6	3
Higher	15	22

CONCLUSIONS

Returning to the original questions that prompted the study:

1. Will LUX make my MicroCell better?
2. Can LUX+MicroCell achieve higher SID than MicroCell alone?

The answers to both are ‘Yes’, and by substantial margins. MicroCell is an effective option for improving SID and ink laydown, and LUX not only raises the performance ceiling much higher, it widens the printer’s options for doing so and seems likely to improve the consistency of their results.