

"THIS WAY UP" in High Definition

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Kodak SQUAREspot Imaging Technology



Kodak And Packaging

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- Kodak has largest and most diverse prepress and print portfolios in packaging
- Covering solutions that go from design and concept, brand communication, through production workflow, to imaging devices and consumables for offset, letterpress, flexo, and digital printing, through to brand protection and security
- Kodak has offered analog flexo plates to all market segments for almost a decade
- Kodak has offered digital flexo plates in the form of Flexcel NX since 2008 to all markets except post-print corrugated
- Post-print corrugated was a special challenge in size and format
 Well the wait is over, in multiple formats, and all at once!

The Broadest Portfolio In Packaging Prepress And Growing!



Service and Support

A Brief History Of Flexcel NX

- Since its launch in Drupa 2008, Flexcel NX led the revolution in Flexo and the digital flat-top dot solutions
- Using the fastest imaging technology, with simple options
- With size being its constant challenge it has grown in format and market share obtaining greater plate volume rapidly
- DigiCap NX revolutionized the ink transfer mechanism in 2010
- Constantly winning awards, but more importantly generating greater productivity and profitability at printers and trade shops
- Also imaging security and electronics applications at 12,800 DPI
- The final major frontier in Flexo was post-print corrugated

Established Flexcel NX System portfolio

- A range of formats to suit your needs
- Same outstanding **Flexcel** NX Plate capabilities and on-press performance

Flexcel NX Narrow System



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- Ideal for narrow web applications
- Flexcel NX Plates up to 24" x 30"
- Accredited for DITR film
- Hybrid offset plate option up to 838 x 990 mm



- Upgrade available from narrow to mid
- Flexcel NX Plates up to 31.5" x 42"
- Accredited for DITR film
- Hybrid offset plate option up to 838 x 1143 mm

Flexcel NX Wide System with Flexcel NX Wide-C Imager



Flexcel NX Wide System with Flexcel NX Wide Imager



- Compact, robust design
- Flexcel NX Plates up to 42" x 60"
- Robust Kodak DITR film imaging up to 42" x 60"
- Hybrid option for offset plates up to 1325 x 1630 mm



- Ideal where VLF offset plates are also required – up to 1562 x 2070 mm
- Flexcel NX Plates up to 42" x 60"
- DITR film imaging up to 42" x 60"

Flexcel NX Mid System

For Growth In Post-Print Corrugated

- It was considered essential that Kodak adds to the portfolio with:
 - 50"x80" Imaging Capabilities
 - 50"x80" Plates & TIL

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- De-lamination of TIL from the Plate for ease of use
- Specific Softer Plate Formulation For Post Print Corrugated
- These have been developed and are being introduced to the market
- Allowing Kodak to now offer the same benefits achieved in the other market segments to post-print corrugated printers
 - Full tonal range with pixel for pixel imaging
 - Higher densities with less impression with DigiCap NX
 - Excellent ink transfer for less on press cleaning
 - Simplest prepress and fastest imaging while 100% High Def.

NEW Kodak 5080 Complete Solution

Kodak Flexcel NX 5080 System

A fully integrated solution that includes:

• Flexcel NX Wide 5080 Imager

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• Flexcel NX Wide 5080 Laminator



- Flexcel NXH and NXC Plate Production In 5080 Size
 - NXC at 0.112", 0.125", 0.155" at 42"x60" & 50"x80"



Kodak Flexcel NX 5080 System provides opportunity in:

 ALL existing Flexo packaging markets plus now also including
 Pre-print liner
 Post-print corrugated



What Does The Kodak Flexcel NX 5080 System Offer Its Users As Standard Benefits?

- The fastest Flexo plate imaging system today @ approximately 18 minutes per 5080 TIL, including DigiCap NX
- 100 % High Definition imaging with SQUAREspot technology
- Exclusive Pixel-For-Pixel imaging, to simplify prepress & proofing
- Full 256 Gray levels imaged for full tonal range and contrast with 0.4 – 99.6%, up to 300 LPI
- Simple ON or OFF options for revolutionary surface texturization in DigiCap NX
- 100% Flat Top dot solution, no compromise
- Ability to also image from the same imager :
 - offset plates

- DITR as dry imaged analog film for sheet analog flexo plates
- DITR as dry imaged analog film for liquid flexo plates
 - DITR retains 1:1 image to film for sharper plate image

"THIS WAY UP" in High Definition

- It should not be assumed that because the Flexcel NX system is 100% High Definition imaging, it's just for a high end niche market
- The reality is far from the this, with the improvements in ink transfer, plate life and tonal range making it equally applicable for:
 - I-color "THIS WAY UP" or a logo on a post-print box
 - I or 2 color screens and tones on a post-print box
 - 4-color process at 133+ lpi on a post-print box

The reasons for this are simple

- Improved ink transfer for higher densities without more ink
- Reduced fluting through DigiCap NX and less impression
- Reduced dot gain, and greater contrast in highlights, mid tones, and shadows
- Future ability to reduce ink volume usage and potentially use lower grade face stocks for the print surface

Sample Test Results

- This presentation amounts to the announcement of the Flexcel NXC plate format being added to the Flexcel NX System
- To date trials have been carried out under NDA and few are available to be revealed publically
- A sample set of test results will be shown here today, for a specific set of test conditions
- The results obtained were similar in their trends as to when Kodak introduced the Flexcel NXH plate for the broad Flexo market
- Further press trials are in progress, as this product is fully commercialized with the publication of the results expected

Sample Results From Comparative Trials

- Trials were run in Europe by a Kodak partner and printer
 - 60 LPI on 2.84 mm 0.112" plates

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- Compared NXC to normal competitive plate technology
- Results showed a 12% increase in density with NXC on same board, ink, and anilox rolls, with significantly lower dot gain

2 Plates In Comparison Test on 2.84, 0.112" Plate					112" P	ate	Competitive VS NXC Plate Test on 2.84, 0.112" plate at 60 lpi
		1%	20%	50%	70%	90%	
Comp Cyan 60	LPI 1	13%	31%	61%	79%	97%	90%
Kodak Cyan 60	LPI	2%	26%	56%	74%	93%	80%
Competitive V 100% 90% 80% 60% 50% 40%	S NXC Plate T	Test on 2.	84, 0.112"	plate at 60) pi		
30% 28% 10%			-	-			Gain With NXC
0% 5%	10% Comp Cyan 60	DLPI	15% NXC Cyan 6	20% 50 LPI		25%	0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 10 Comp Cyan 60 LPI – NXC Cyan 60 LPI

Sample Results From Comparative Trials

 Illustrating 1-Color Improvements

- The results show full tonal range is available, from 1%
- Dot gain was lower in all 3 phases, for better contrast
- Anilox & inks were optimized to traditional digital flexo – it can be made better again









Adding The 2nd Color – As A Screen / Tone

 Adding the magenta results shows a greater difference

- Dot gain for NXC was about 50% of that of the competitive plate
- The grouping of the NXC results were excellent
- Ideal for screen and tone work





2 Plates In Comparison Test on 2.84, 0.112" Plate						
	1%	20%	50%	70%	90%	
Comp Magenta 60 LPI	16%	36%	73%	87%	99%	
Kodak Magenta 60 LPI	5%	29%	61%	79%	94%	

Flexcel NXC Suits 1 & 2 Color Jobs

- The printer has a great deal of potential benefits in simple as well as high end work, as seen daily in flexible packaging markets
- For the post-print corrugated printers, these include
 - The benefits of improved ink transfer
 - Fuller tonal range with less dot gain
 - Reduced fluting with less impression
 - Opportunities to reduce ink usage
 - Opportunities to increase press speeds
 - Potentially longer plate life

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- Many brand owners would like their 1 color boxes to look better, with reduced dot gain, better density, and more tonal range
 - Plus with the normal plate life enhancements with DigiCap NX they don't need to be so concerned about plate life for tones

Now Looking At 4-Color Process Example

Again with 2.84 mm, 0.112" plate at 60 LPI

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 The NXC plate shows the consistency in imaging and better ink transfer, for much tighter grouping of readings



	1%	20%	50%	70%	90%	
Yellow 60 LPI	10%	25%	54%	74%	95%	
Cyan 60 LPI	13%	31%	61%	79%	97%	
Magenta 60 LPI	16%	36%	73%	87%	99%	
Black 60 LPI	20%	40%	81%	93%	98%	

Rouak Flexcel NAC Plate Test off 2.64, 0.112 plate					
	1%	20%	50%	70%	90%
Yellow 60 LPI	3%	23%	54%	72%	91%
Cyan 60 LPI	2%	26%	56%	74%	93%
Magenta 60 LPI	5%	29%	61%	79%	94%
Black 60 LPI	5%	31%	64%	79%	95%

4-Color At 60 LPI Comparison

- At all 3 key points the dot gain was significantly less, and generally smoother in the data measurements
- This confirms the applicability of this technology even at relatively low LPI values



Pushing The Envelope At 175 LPI

 Although not recommend as normal, higher LPI values were also tested

- Cyan and magenta plates were also run at 175 LPI
- Dot gain for both plate systems increased, and density decreased
- The ink and anilox were not optimal for this high LPI value
- The competitive plate had excess gain and minimal tonal range, not feasible at this LPI
- The NXC plate showed promise but this may also be the upper limit LPI?

2 Plates In Comparison Test on 2.84, 0.112" Plate						
	1%	20%	50%	70%	90%	
Comp Cyan 175 LPI	24%	43%	81%	94%	97%	
Kodak Cyan 175 LPI	7%	34%	65%	80%	97%	
Comp Magenta 175 LPI	25%	47%	85%	96%	98%	
Kodak Magenta 175 LPI	8%	35%	68%	82%	97%	







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So What Does This Mean For The Post-Print Corrugated Market?



Kodak SQUAREspot Imaging Technology



How Does This Work For Post-Print Corrugated – In Prepress?

In Prepress:

- 100% Flat Top Dot Ideal for Post-Print Corrugated
- 100% High Definition means simplified workflow in prepress
- Full tonal range means less need for prepress correction
- Simplified dot gain compensation curves to manage jobs
- DigiCap NX is applied at imager, irrespective of workflow
- No loss of imager productivity when applying DigiCap NX
- Not imaging the plate, instead the TIL then laminating
 - No heavy plate to load or risk fly-offs in imager
 - Imager is 100% High Definition, no longer the bottle neck
 - Same process flow for NXH and NXC plates
- Simplified inventory control with 1 NXC formulation for 42x60 & 50x80 sizes in 3 plate thicknesses 0.112", 0.125", 0.155"
- Smaller files sizes for High Definition mean less ripping and storage demands

How Does This Work For Post-Print Corrugated – In Prepress?

In Prepress:

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- Flexcel plates typically also reduce the time and energy demands by using:
 - Typically fastest processed plates in the market
 Results in less solvent absorption and loss per plate
 - Reduced dryer energy use by about 30% per hour
 - Reduced dryer time by about 50%, increasing capacity
 - Increase UVC to 15+ min for better ink transfer on press

Also

- Adds DITR imager capabilities to replace silver halide film
 - For analog sheet and liquid plate applications
- Hybrid offset plate imaging upgrade available in 1 device
- Better predictability in proofing from pixel-for-pixel imaging
- All function together to increase productivity, capacity, profitability and sustainability for the prepress and plate makers

How Does This Work For Post-Print Corrugated – In Printing?

Printing Today Using Existing Equipment:

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- Better ink transfer mechanism results in high densities with the same or less ink used, by minimizing pin holes
 - Makes cleaner and brighter colors for more impact
- Reduced impression needed to achieve ink transfer
 - For less fluting and smoother tones, with less dirty print
- Ability to increase tonal range and contrast on same presses
- Ability to add more screens, tone and process printing
- Typically plates run cleaner with less stops for dirty print

Future Printing Using Optimized Equipment

- Potential to decrease ink volume without loss in density
- Reduction in ink film weight and impression allows faster ink drying and less absorption into board
 - More color impact and potential press speed gains
- NXC seems to prefer less coated and calendared face stock for potential savings in substrate and increased flexibility
- These combine to further help brand owners with sustainability goals

How NX Works

We have talked about the results and some of the benefits, but what do the following really mean?:

- SQUAREspot imaging
- 100% High Definition
- Pixel-for-pixel imaging
- DigiCap NX

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100% Flat Top Dots

Looking At Imaging – Starting At The Start

A Digital File For The Image Graphics Consists Of A Whole Series Of Square Pixels In A Fixed Grid Pattern



Looking At Imaging – Starting At The Start

When The Pixel Is Used It Changes In The Digital File From A "0" To A "1".

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Each Square Pixel Must Be Fully "ON" Or "OFF"!

The Pixels Are All Turned On And Off To Form the Required Image



Today There Are Primarily Two Imaging Systems For Flexo Plates



Today There Are Primarily Two Imaging Systems For Flexo Plates

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While The SQUAREspot Laser Does Not Create An Error

Explaining The Imaging Error When Using A Gaussian Laser System For Digital Flexo

Pixel Laser Beam

The Round Beam For A Gaussian Laser Must be Bigger Than The Pixel To Cover The 4 Corners Of The Whole Pixel Completely



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The Red Areas Of The Laser Beam Indicates The Imaging Error Compared To The Original Pixel(s).

The % Error Is Significant Less (3X) For Larger Group Of Pixels – Outer Perimeter Only.



With Or Without Oxygen Inhibition?



Neither Matches The Original Digital Pixels In The Dot!

100% High Definition All The Time

- The Flexcel NX System Operates In High Definition 100% Of The Time
- Each Pixel Is Equivalent To 4x4 Laser Hits (10,000 dpi)
 - DigiCap NX Uses 4x2 Laser Hits
- The Flexcel NXH Plate Specifications Are

- 0.4-99.6% for ALL 256 Grey Levels Up To 300 LPI
- If Required The TIL And Plate Will Image At The Imager Maximum Of 450 LPI Using Standard Equipment



Real Example Of The Difference In Imaging!



For traditional flexo printing with spot colors this is less important, for process printing to consistently build colors it is CRITICAL!

Exclusive Pixel 4 Pixel Reproduction

Unmatched exclusive imaging technology

Kodak





Pixel-4-Pixel All The Way To The Plate

Kodak



DigiCap NX Uses The Unique Imaging Capabilities In The SQUAREspot Imaging System

- Instead of using normal 4x4 laser hits for each square pixel, DigiCap NX use 4x2
- Images precise 10.6 x 5.3 micron areas
- Images on solids through screens down to typically 4% at 150 LPI

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 Impossible to do with traditional digital Flexo laser technologies





Surface Texturized Through Solids & Tones – DigiCap NX



- After normal UV exposure and plate processing, the plate surface looks like this →
- Plate surface consists of small islands of plate surrounded by ink evenly dispersed over it
- No longer transferring individual small spots of ink as from the anilox cells
- Instead a thin layer of ink
- Dispersing the ink on the plate before contact with substrate



Comparing DigiCap NX Screening



Traditional plate cell patterning applied

The Density Issues All Start In Ink Transfer

Anilox Roll Surface Is Covered By Millions Of Cells

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Looking In More Detail



The Density Issues All Start In Ink Transfer



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The Anilox Transfers Ink To The Plate

But The Rotation Of The Plate And The Impression Pressure Causes The Dots Of Ink Join Up In Ridges

Leaving Voids In The Print Which Reduces The Density Achieved

Explaining DigiCap NX In Action

Traditional Digital Flexo

Traditional Solid Flexo Plate Surface

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Flexcel NX With DigiCap NX

Flexcel NX Plate Surface With DigiCap NX Applied in 10x5 Micron Islands

Ink Is Applied To The Plate Surface From The Anilox Cells As Ridges Separated By Voids



The Ink Is Transferred From The Anilox, But The Pattern Is Broken Up, Forming An Ink Layer Around The Islands



The Ink Transfers To The Substrate Under Pressure, As Ink Ridges Separated by Voids



The Ink Transfers To The Substrate Under Lower Pressure, As A Thin Layer, With Some Very Small Voids Where The Islands Were



Real Prints Show the Power of Kodak DigiCap NX

Traditional Digital Flexo

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Flexcel NX Plate with Kodak DigiCap NX applied

Same press, same ink, same anilox, same substrate



Anilox Walls Cause Voids In Print



Smooth ink laydown

By breaking down the anilox wall pattern on the plate surface

Applied Throughout Tonal Range



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- DigiCap NX has a single setting with ON or OFF functionality
- It is applied to TIFF file as option on imager
- It does NOT increase imaging time
- Applied throughout tonal range – down to about 4%
 @ 150 LPI
- Image shows applied to 30 micron dot of just 7 pixels

Trendsetter Wide-C or Wide Imaging Of Flexcel NXH OR Flexcel NXC Plates With Just 5 Simple Steps

 Image the Flexcel NX Thermal Imaging Layer (TIL) in the Trendsetter NX Thermal Imager

- 42.0 x 60.0 in 11 min
- 50.0 x 80.0 in 18 min
- 2. Laminate the imaged TIL to the **Flexcel** NXH or NXC Plate





- 3. Back expose the plate then main expose the plate through the TIL
- 4. Simple return plate to the laminator and remove the TIL from the Flexcel NX Plate
- 5. The use enhanced processing steps using standard solvent processing equipment

Functional Printing Opportunity





Delivering functionality beyond visual communications via specialized material formulations and deposition technologies that enable printed solutions

Functional Printing in Every Day Life

Going beyond visual communication to deliver functionality to new markets



In Conclusion

- Kodak continues to innovate and provide disruptive and game changing technologies to Flexo and the packaging industry
- Kodak has waited to join the digital flexo plate market for postprint corrugated until it has the complete right solution
- The Flexcel NXC plate, in combination with the 50"x80" format launches a next generation Flexo technology, driving flexo forward
- Simplifying the prepress management while enhancing the capabilities and productivity on press, with more shelf impact
- With benefits for single color as well as process printing, it opens the door to brand owners being able to gain greater brand recognition and marketing opportunities in post-print corrugated
- The technology is here, are you ready to go to the next level?

Thank You For Your Attention

Any Questions?

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