

HD Flexo Technologies

- the printing issues
- technical solutions & markets
 - Real costs
- FHDF & HD color
- Automation

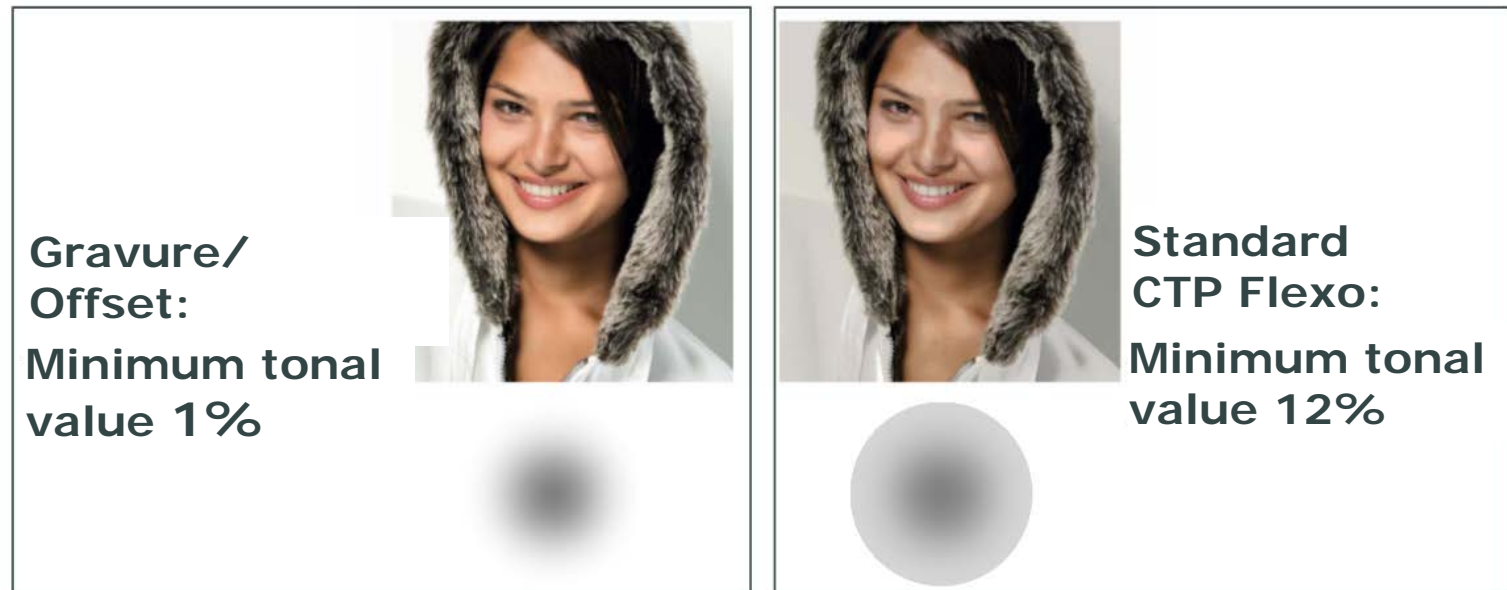
- Ian Hole
- VP Market Development Flexo
- FPPA Seminar March -2014

Typical Flexo Print Issues

1

Flexo Problem #1: Too strong minimum dots

- Large Minimum Tonal Value (especially at higher LPIs)
→ **low tonal image contrast, improper image appearance**
- Transition to Zero
→ **Visible vignette edge due to too large minimum tonal values**



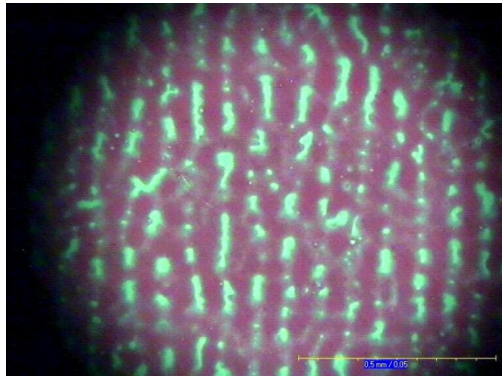
- **„Flexo-Problem“: Minimum dots bend on the press!**

Flexo Problem #2:



Insufficient ink laydown & Uneven ink laydown

- Flexible Packaging printing often suffers from inhomogeneous ink laydown:



Pinholes in solid area printed
with digital flexo plate

- Pinholes are reducing the solid appearance to the human eye
- Overprints and pantone colors become uneven and checky
- For better ink laydown, printers often have to
 - Separate into one plate for solids and one plate for process work → **higher cost**
 - Use higher volume Anilox roller → **lower quality of vignettes & highlights**

2008... HD Flexo

2



HD Flexo – 4000ppi Imaging Technology

- **Increasing Image Screen Ruling has limits!**
 - Images are composed of 256 grey levels (Repro side)

Number of natural grey levels = $(\text{PPI}/\text{LPI})^2$

PPI = CTP Imaging resolution

LPI = job linecount

(Natural grey levels are further reduced by dot gain compensation)

	2400 ppi	2540ppi	4000ppi
150lpi (60L/cm)	256	287	711
175lpi (70L/cm)	188	211	522
200lpi (80L/cm)	144	161	400
250lpi (100L/cm)	92	103	256

Only 4000ppi is reproducing the full image contrast above 150 LPI

Only 4000ppi has enough grey levels at 250LPI

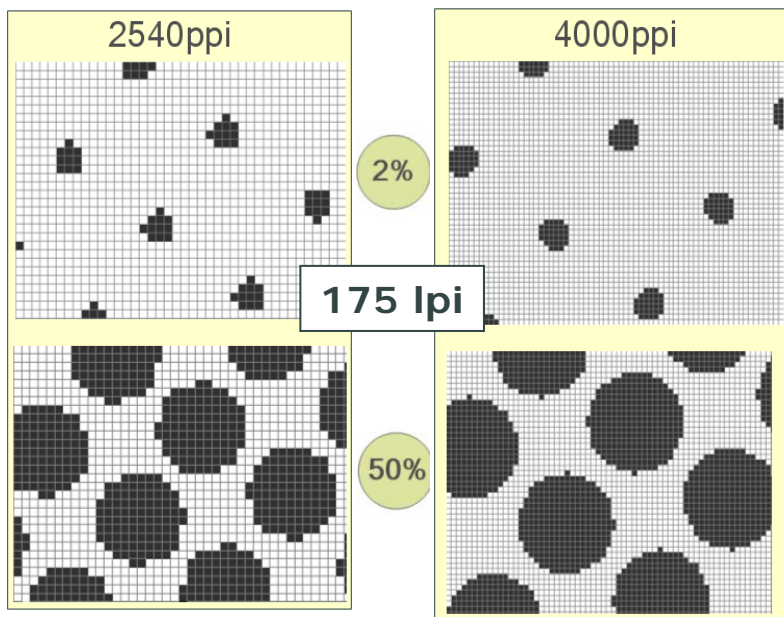


What is HD Flexo?

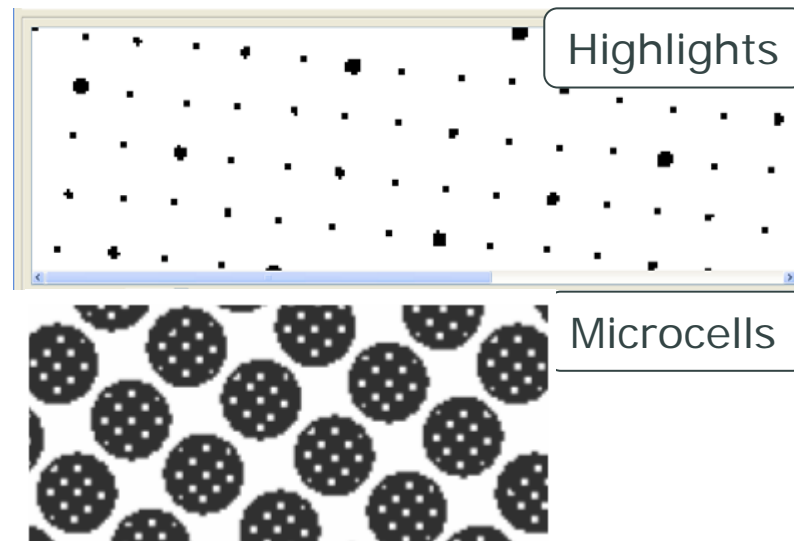
HD Flexo is a unique imaging technology combining:

- **High resolution imaging** at 4.000ppi / 6 μ m laser spot size
- **High Definition screening** technology

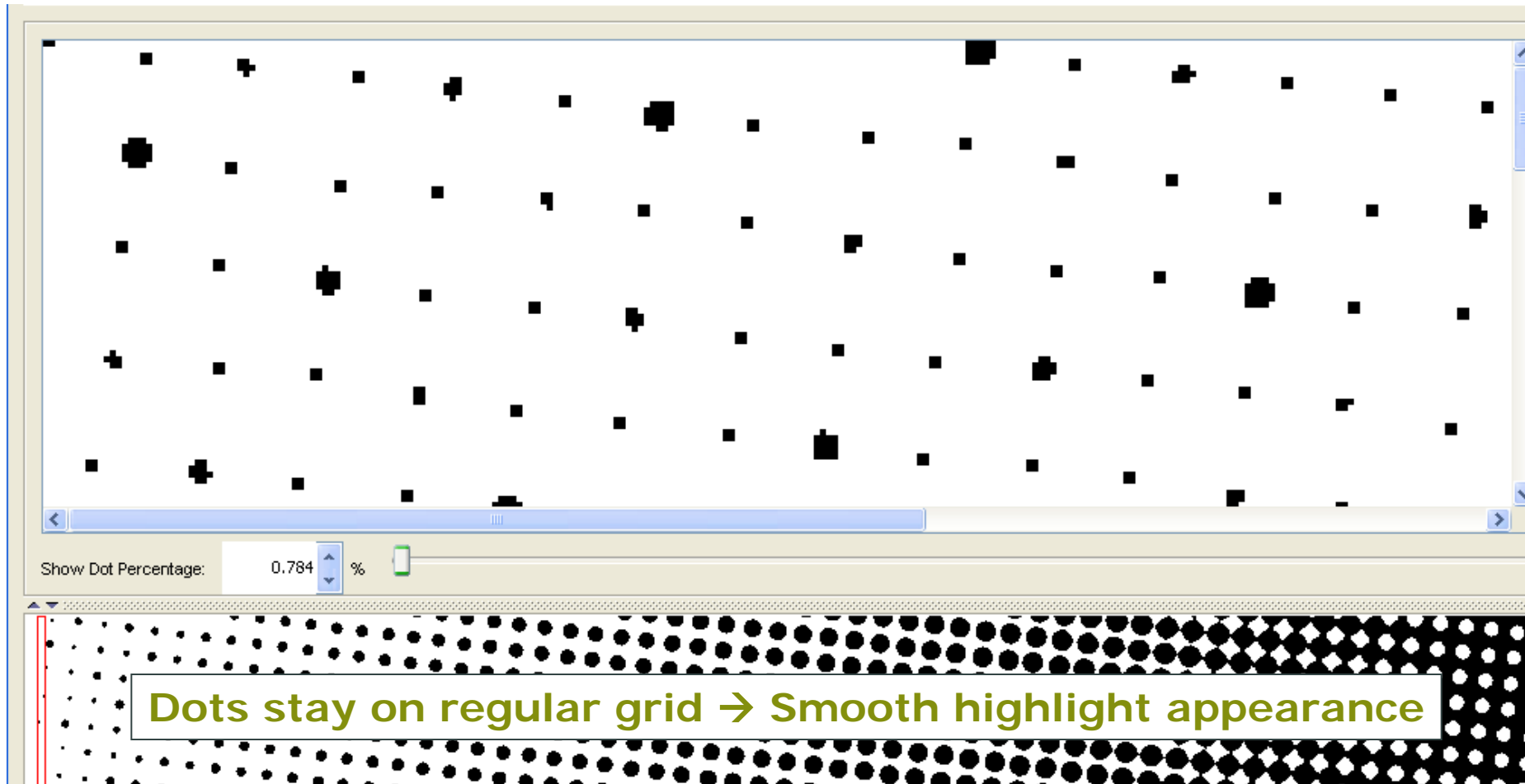
High resolution imaging



High Definition screening



Highlight stabilization by balanced dot sizes



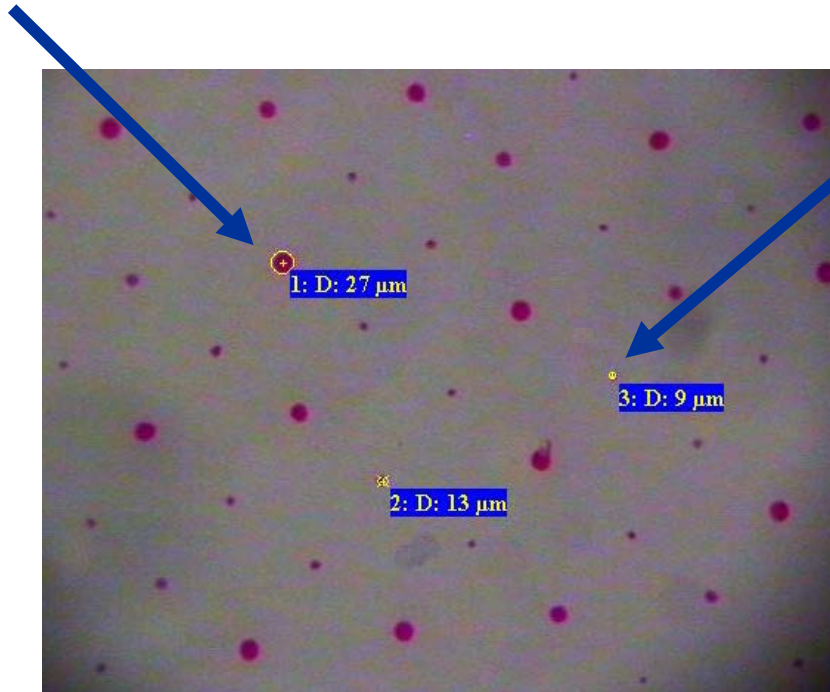
Dots stay on regular grid → Smooth highlight appearance

HD Flexo - Highlights

- **Solution of Flexo-Problem #1: Stable minimum dots**

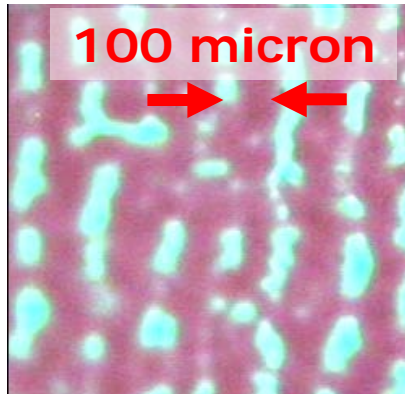
Supporting dots for mechanical stability
and as distance holder to Anilox roller

Stable printing
minimum dots

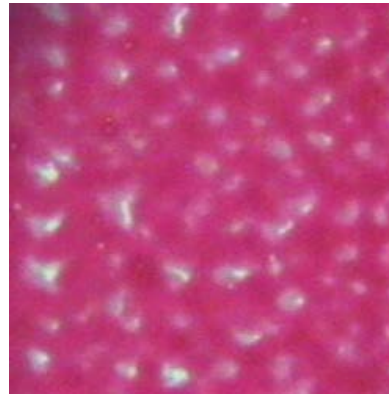


HD Flexo – Solids and Shadows

- HD Flexo Microprocess in flexible packaging printing:



Solid printout
with standard
plate surface

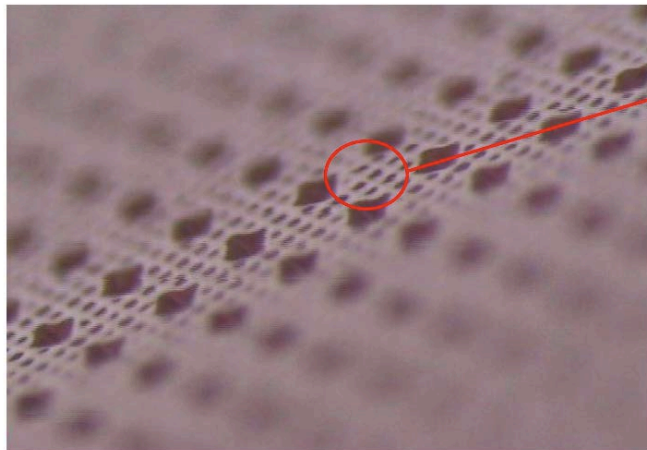
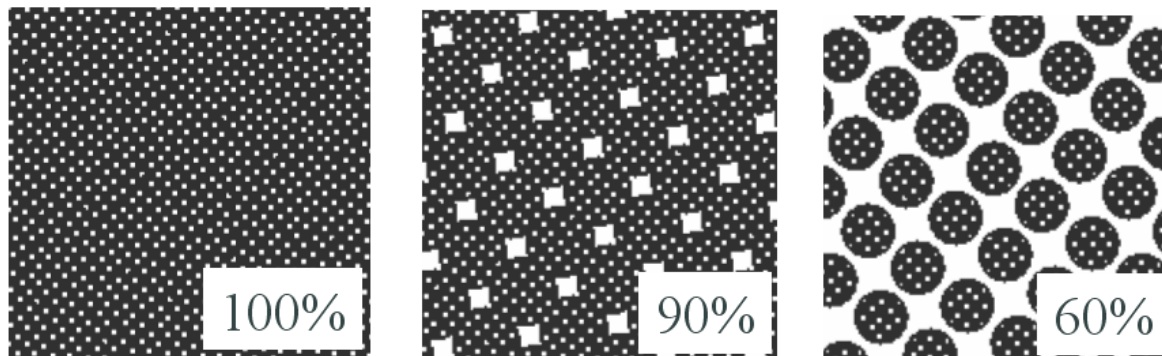


Solid printout
with Micro Screening
on plate surface

- Ink laydown improved but still far from ideal
 - too low solid ink density (SID) with fine Anilox rollers
 - only marginally improvement with spot colors/white

HD Flexo – Solids and Shadows

- **Solution to the Flexo-Problem #2: Microcells**



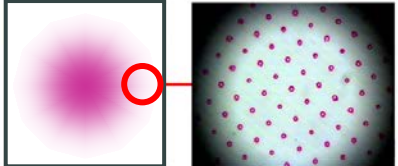
75% tint with
Microcells on
processed
plate

2013... Full HD Flexo

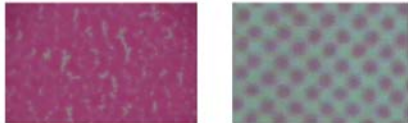
Don't compromise -
use the best out of both worlds!

3

Digital Plate („Round Top“)



HD Flexo vignette to zero
→ Finest minimum dots in print
→ HD Flexo vignettes down to zero

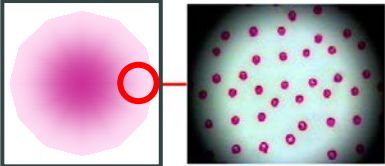


MicroCell Solid MicroCells with 500lpi (200L/cm)


→ Good Solids with almost no pinholes

HD FLEXO

Flat Top Plate



Vignette to zero
→ High dot gain
→ Vignettes to zero with grainy „Samba“-Screen only

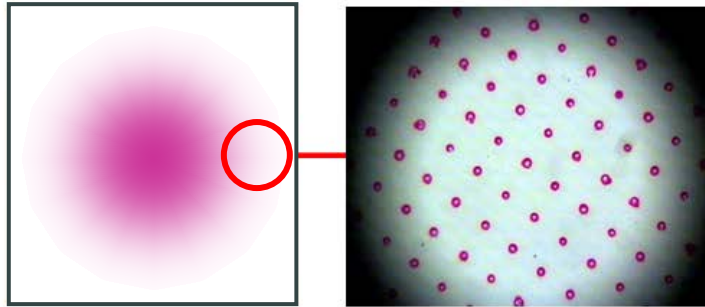


MicroCell Solid MicroCells with 1000lpi (400L/cm)

→ Perfect Solids with very high solid ink density

No Compromises – Good Highlights and Solids

Digital Plate („Round Top“)



HD Flexo vignette to zero

- Finest minimum dots in print
- HD Flexo vignettes down to zero



MicroCell Solid

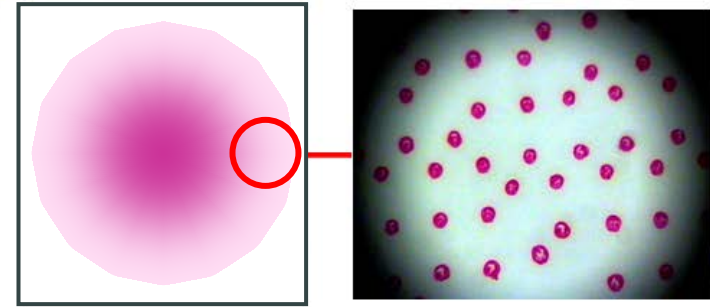


MicroCells with
500lpi (200L/cm)

- Good Solids with
almost no pinholes



Flat Top Plate



Vignette to zero

- High dot gain
- Vignettes to zero with
grainy „Samba“-Screen only

**needs
Pixel+**



MicroCell Solid

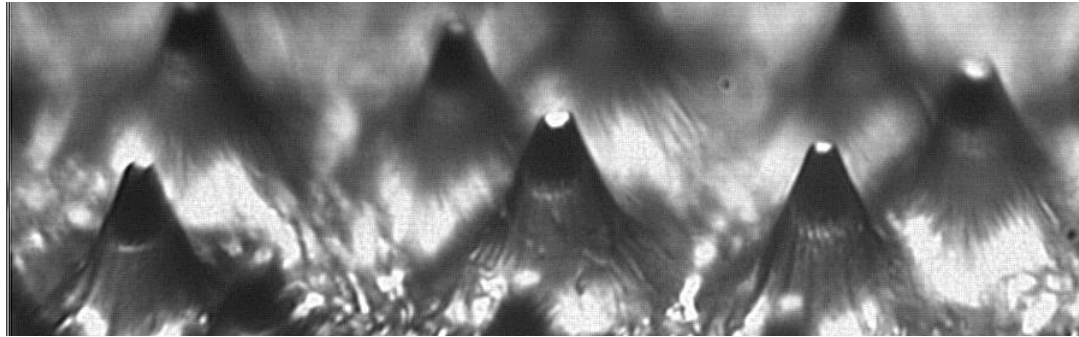
MicroCells with
1000lpi (400L/cm)

- Perfect Solids with very
high solid ink density



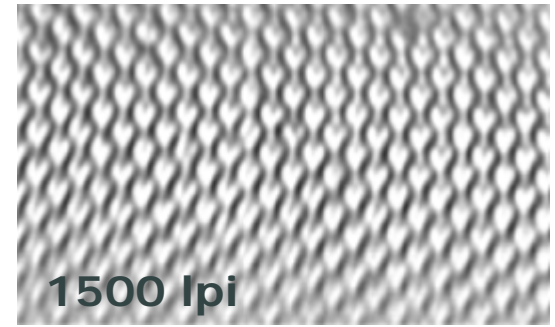
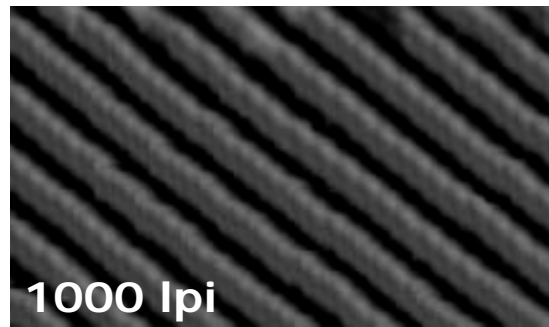
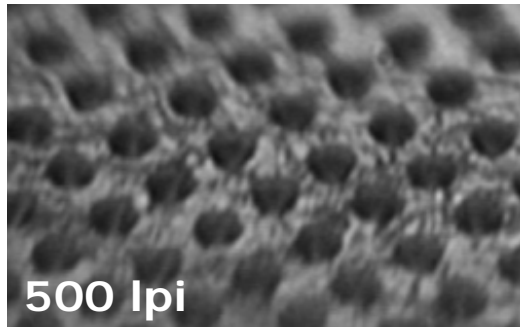
Why does Full HD Flexo boost Highlights & Solids?

- Full HD Flexo creates a unique dot shape:



HD Flexo dots in highlight area (rounded dot shape)

High definition Microcells in solids and vignettes

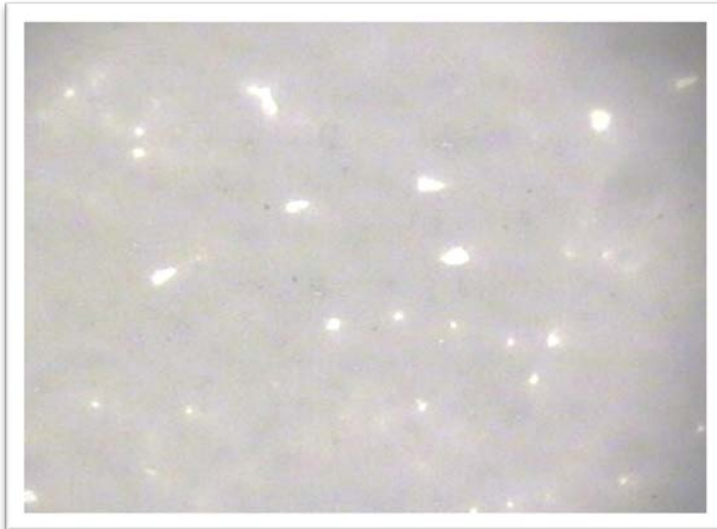




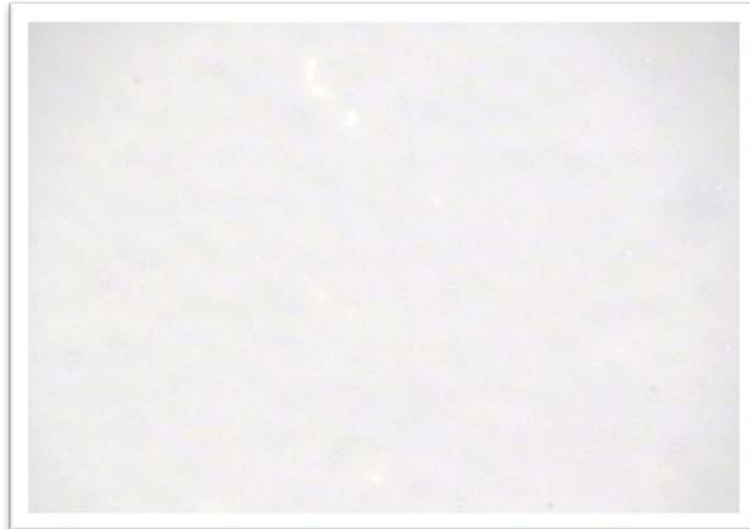
**White
printing**

Full HD Flexo in Flexible Packaging

Microscopic Details:



**White printing
with standard solids**



**White printing
with Full HD Flexo Microcells**

Benefits:

- Stronger white with same Anilox roller
→ **Saves a double press print units**
- Same white strength with finer Anilox roller
→ **Reduces ink consumption (ca. -25%)**



Print
sample

Full HD Flexo in Flexible Packaging

Strong colors in contrast with light tones



Natural image reproduction

Smooth transitions

Image details

Smooth transitions

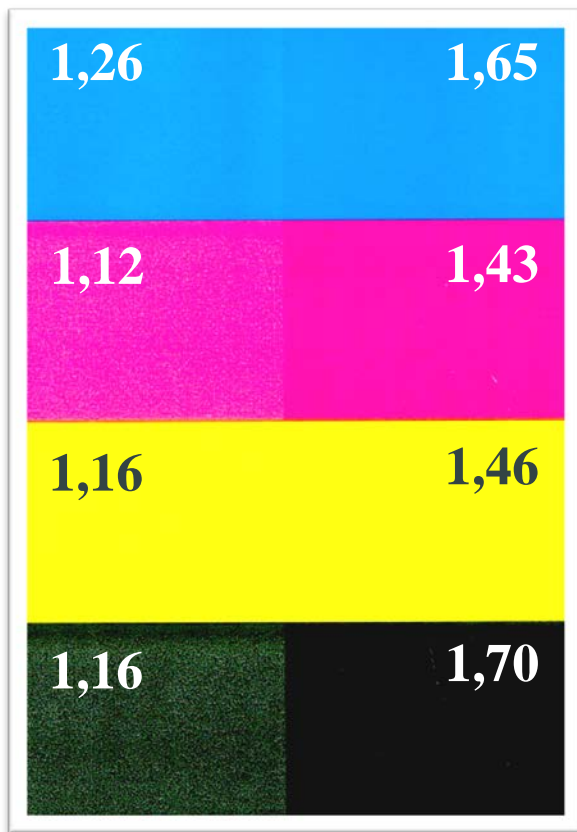
Highest ink transfer
Left: Standard solid
Right: Full HD Flexo
Microcells

Strong homogeneity
improvement
of white printing



Full HD Flexo in Flexible Packaging

Standard Flexo without Microcells Full HD Flexo with Microcells



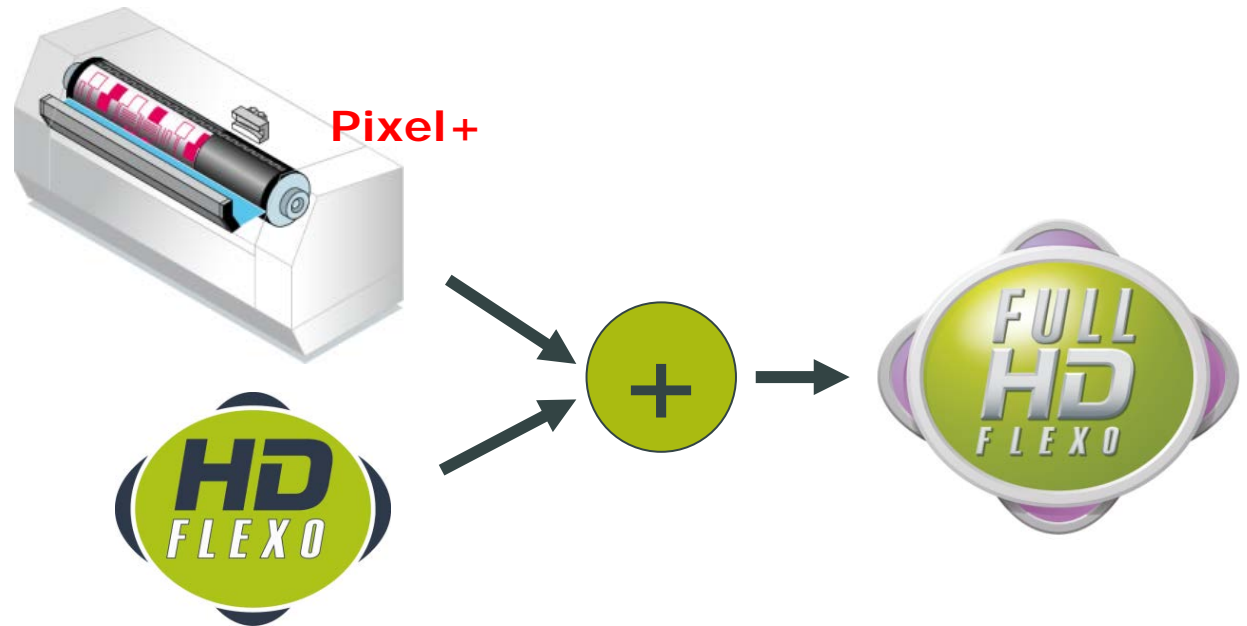
Bright intensive colors with smooth vignettes to zero:



What is Full HD Flexo?

Digital UV main exposure (InlineUV)

- UV LEDs inside CDI → Leapfrog in platemaking consistency

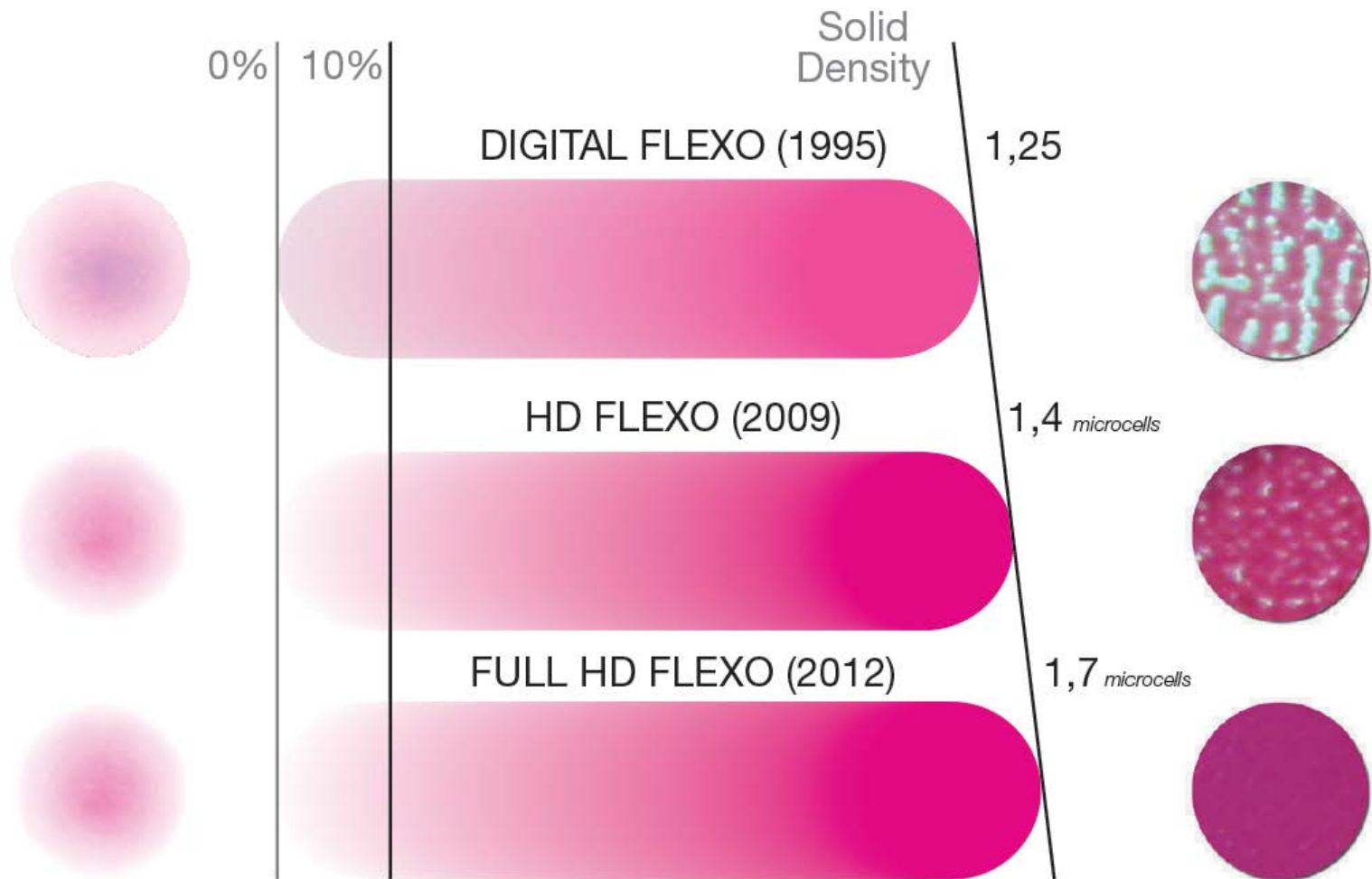


4000ppi imaging & screening technology

- HD screening for highlights to zero
 - Microcells for improved ink laydown
 - Brilliant image contrast & detail sharpness
- New Flexo print quality standard



Full HD Flexo Print Quality



Full HD Flexo for Flexible Packaging

High End Level

Jobs with 150lpi ... 250lpi
Anilox > 1100lpi



Quality Level

Jobs with 130lpi ... 150lpi
Anilox 900 ... 1100 lpi



Main Stream Level

Jobs with 110lpi ... 130lpi
Anilox 800 ... 900 lpi

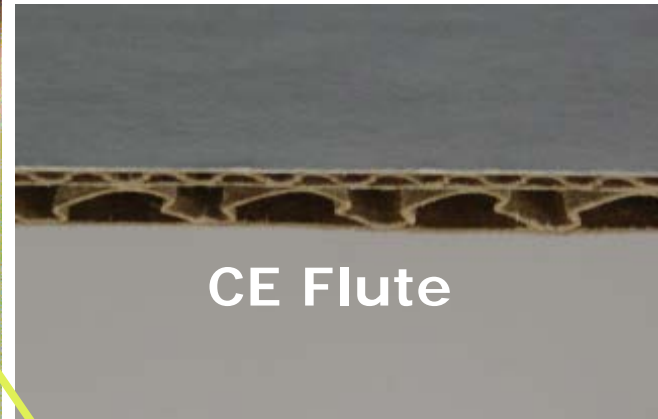




Full HD Flexo for Corrugated Post-Print



Perfect fadings Strong and intensive colors



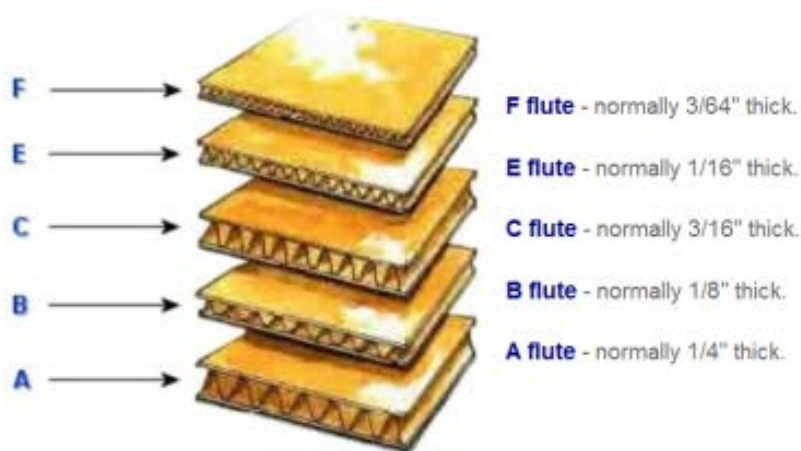
CE Flute

Improved highlights and higher image contrast



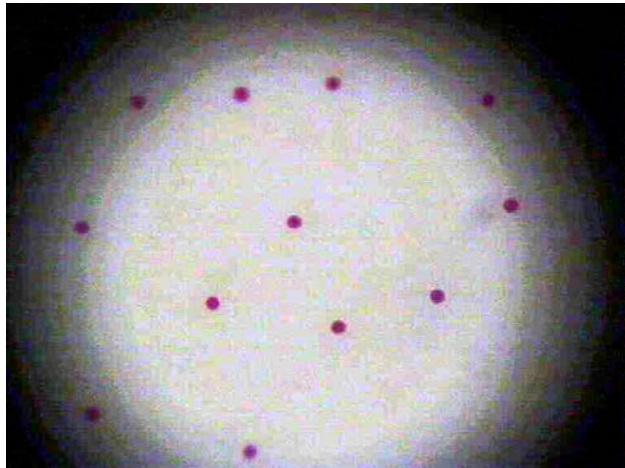
Full HD Flexo for Corrugated Post-Print

- **Fluting reduction**
 - Process work becomes possible on cheap B-flute and even C-flute boards
- **Improved image quality**
- **Improved highlight stability**
- **Better ink laydown**
 - Even with harder plates
- In some cases **significant SID increase** (ink/substrate related)

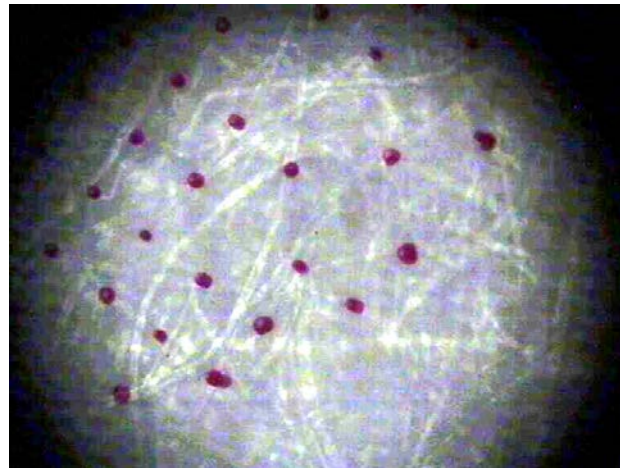


Full HD Flexo for Label Printing

- Better quality on gear driven presses → less gear marks
- Possible to use harder tapes → SID increase
- Dots more forgiving against impression changes
→ Identical printout of all Label repetitions



Full HD Flexo
medium hard tape



HD Flexo
medium soft tape



Talking Points:

- **Flexibility**

- Digital plates and sleeves from all suppliers
- Covers all Flexo applications (Flexible packaging, Corrugated, FC, Labels)
- Consistent Quality certified everytime
- Guaranteed Repeatability over short or long time frames
- NOTHING YOU CANNOT PLATE



- **Compatibility**

- Standard Flexo, HD Flexo and Full HD Flexo plates made as needed
- ALL Legacy work is safeguarded at 2100, 2400 & 2540 resolutions
- Full HD Flexo is Upgradeable to all recent mid/large size CDI models
- CUSTOMER NO RISK POLICY



Talking Points 2:

- **100% digital workflow**

- Fully automatic exposure settings according to individual job tickets
- No manual operator intervention
- Training Curve very short
- Customers have never given back this equipment
- EASIER TO USE






- **Sustainability**

- No additional consumables (no films, no laminates, no chemistry...)
- No electrical energy consumed in standby mode
(bank exposure frames consume several kW in standby)
- Diode Energy needs at least 50% less than existing fluorescent tubes
- No toxic disposals
(bank exposure frame lamps contain e.g. Mercury)
- No fire risk from Cool Running Diodes








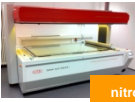






















REAL COST of Plate Imaging / Exposure 4

Plate Imaging / exposure – the buying process

Company	Product	Initial Investment	Technology Fee, Cost of Ownership, "Click Charge"	UV Tube changes per year	Consumables TIL, laminate, Gas cylinders	Plate Volume per year			Total cost over 1 year	Total cost over 3 years	Total cost over 5 years
	<p>Buying has an emotional element – a trusted sales person, always bought from them etc...</p> <p>Some solutions appear to fit better with your business</p> <p>Could be influenced by special promotions – CALL IN THE NEXT 5 MINUTES and we will DOUBLE THE OFFER</p> <p>BUT information about ALL your options is vital</p> <p>Some Pertinent facts</p>										
											
											
											
											






of platemaking steps

Company	Product	Oxygen inhibition	Image-setter	Film TIL	Laminator	Plate	CDI	Laminator	Exposure Unit	Special Exposure Unit	Plate-making
 ESKO artwork	InlineUV 2	High UV density					 InlineUV				 solvent thermal 2
 DUPONT	Cyrel® Digiflow	Nitrogen					 1		 nitrogen 2		 solvent thermal 3
 MacDermid		LUX membrane				 14 PT. 12 PT. 8 PT. Low Dot Gain Excellent Drapes Quick Imaging Time Minimal Waste MacDermid	 1	 LUX Membrane 2	 3		 4
 FlintGroup	NExT	High UV density				 FlintGroup nyloflex® Digital nyloflex® Digital	 1			 NExT Exposure 2	 3
 Kodak	Flexcel NX	Thermal Imaging Layer	 1		 2				 3		 4






REAL COST of plate Imaging / exposure – Initial Investment

[illegible]

REAL COST of plate Imaging / exposure – Fees

Company	Product	Initial Investment	Technology Fee, Cost of Ownership, "Click Charge"	UV Tube changes per year	Consumables TIL, laminate, Gas cylinders	Plate Volume per year			Total cost over 1 year	Total cost over 3 years	Total cost over 5 years
	UV Main Exposure	Upgraded Imager	0	No Fees							
	O2 Depletion Using Gas	Frame & Purge Equipment	?								
	O2 Depletion Using Laminate	Film Laminator	?								
	UV Diode Boost	UV Imaging Unit	?								
	Imaged Laminate	Imager & TIL Laminator	?								






REAL COST of plate Imaging / exposure – Tube replacement

Company	Product	Initial Investment	Technology Fee, Cost of Ownership, "Click Charge"	UV Tube changes per year	Consumables TIL, laminate, Gas cylinders	Plate Volume per year			Total cost over 1 year	Total cost over 3 years	Total cost over 5 years
	UV Main Exposure	Upgraded Imager	0	0	<p align="center">NO tube changes but +/-10,000 hrs. life before UV diode replacement</p> <p align="center">Based on moderate plate volume 3 tube changes per year to keep levels stable = large frame users \$10K per year</p> <p align="center">Based on moderate plate volume 3 tube changes per year to keep levels stable = large frame users \$10K per year</p> <p align="center">Based on moderate plate volume 3 tube changes per year to keep levels stable = large frame users \$10K per year</p> <p align="center">Based on moderate plate volume 3 tube changes per year to keep levels stable = large frame users \$10K per year</p>						
	O2 Depletion Using Gas	Frame & Purge Equipment	?	?							
	O2 Depletion Using Laminate	Film Laminator	?	?							
	UV Diode Boost	UV Imaging Unit	?	?							
	Imaged Laminate	Imager & TIL Laminator	?	?							






REAL COST of plate Imaging / exposure – Consumables

[illegible]






REAL COST of plate Imaging / Exposure – Plate Volumes

Company	Product	Initial Investment	Technology Fee, Cost of Ownership, "Click Charge"	UV Tube changes per year	Consumables TIL, laminates, Gas cylinders	Plate Volume per year			Total cost over 1 year	Total cost over 3 years	Total cost over 5 years
 ESKO artwork	UV Main Exposure	Upgraded Imager	0	0	0	?	<p>Plate volumes irrelevant for imaging and UV main exposure has no accumulating costs</p> <p>Plate volumes use more UV tubes in frame and gas cylinders as operating costs</p> <p>Plate volumes use more barrier film and UV tubes in frame as accumulating costs</p> <p>Plate Volumes reflect more florescent tubes in UV frame</p> <p>Plate volumes accumulate more Thermal Film used and more florescent UV tubes for frames</p>				
 DUPONT	O2 Depletion Using Gas	Frame & Purge Equipment	?	?	?	?					
 MacDermid Printing Solutions	O2 Depletion Using Laminate	Film Laminator	?	?	?	?					
 Flint Group	UV Diode Boost	UV Imaging Unit	?	?	?	?					
 Kodak	Imaged Laminate	Imager & TIL Laminator	?	?	?	?					






REAL COST of Plate Imaging / Exposure– Year 1 costs

Company	Product	Initial Investment	Technology Fee, Cost of Ownership, "Click Charge"	UV Tube changes per year	Consumables TIL, laminate, Gas cylinders	Plate Volume per year			Total cost over 1 year	Total cost over 3 years	Total cost over 5 years
	UV Main Exposure	<p>Year 1 means initial investment only</p> <p>Year 1 investment, Fees, Gas cylinder usage and florescent tube replacement based on plate volume</p> <p>Year 1 investment, Rental Fee, Barrier film usage and florescent tube replacement based on plate volume</p> <p>Year 1 investment, Yearly Fee, florescent tube replacement based on plate volume</p> <p>Year 1 investment, Fees, Thermal Film usage and florescent tube replacement based on plate volume</p>									
	O2 Depletion Using Gas										
	O2 Depletion Using Laminate										
	UV Diode Boost										
	Imaged Laminate										

REAL COST of Plate Imaging / Exposure– Year 3 costs

Company	Product	Initial Investment	Technology Fee, Cost of Ownership, "Click Charge"	UV Tube changes per year	Consumables TIL, laminate, Gas cylinders	Plate Volume per year			Total cost over 1 year	Total cost over 3 years	Total cost over 5 years
	UV Main Exposure	<p>Year 3 costs zero \$ = no consumables, no fees</p> <p>Accumulated costs reflected in 3 years usage of gas cylinders, yearly fees and florescent UV tube replacement</p> <p>Costs reflected in 3 years usage of Barrier Film, yearly fees and florescent UV tube replacements</p> <p>Year 3 costs reflected in yearly fees and florescent UV tube replacement</p> <p>3 years accumulated costs reflected in usage of Thermal Film Laminate, yearly fees and florescent UV tube replacement</p>									
	O2 Depletion Using Gas										
	O2 Depletion Using Laminate										
	UV Diode Boost										
	Imaged Laminate										

REAL COST of Plate Imaging / Exposure– 5 Years costs

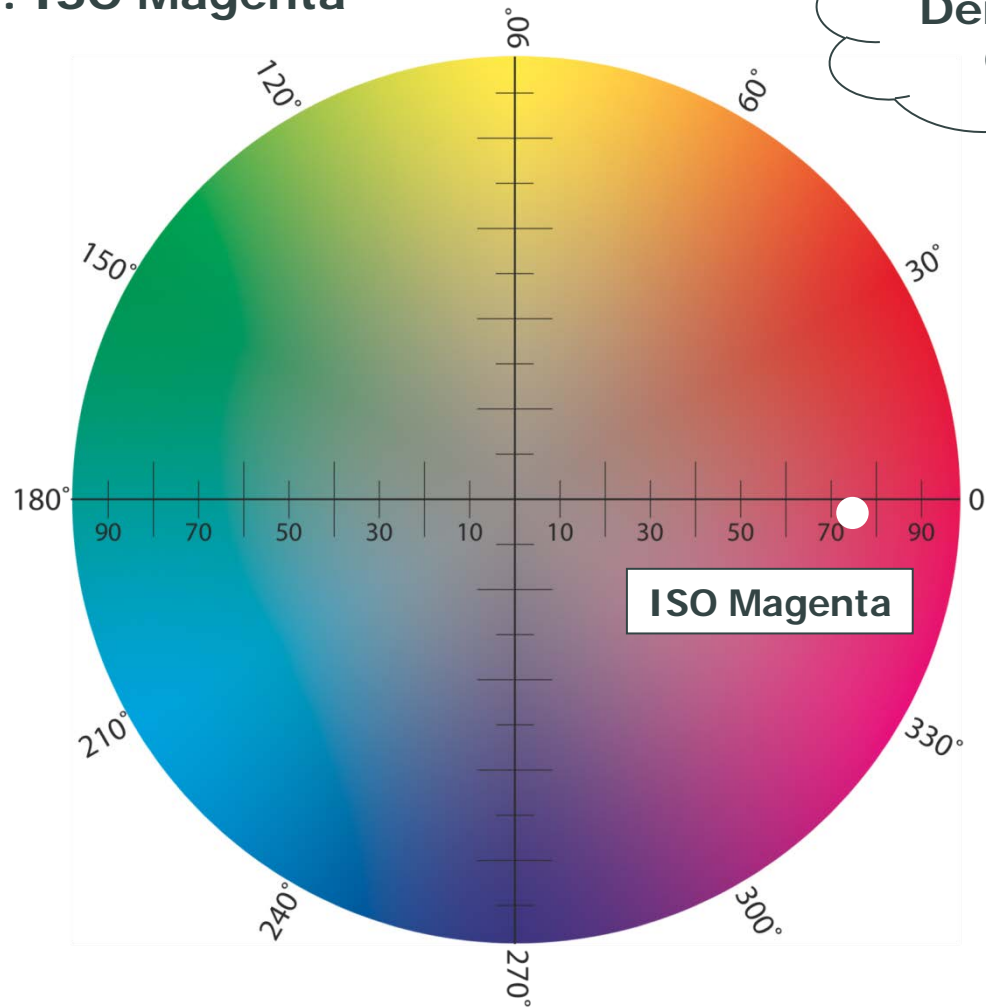
Company	Product	Initial Investment	Technology Fee, Cost of Ownership, "Click Charge"	UV Tube changes per year	Consumables TIL, laminate, Gas cylinders	Plate Volume per year			Total cost over 1 year	Total cost over 3 years	Total cost over 5 years
	UV Main Exposure	<p>Year 5 cost = possible UV diode replacement dependent on plate exposing volume= no consumables, no fees</p> <p>Accumulated costs reflected in 5 years usage of gas cylinders, yearly fees and florescent UV tube replacement</p> <p>Costs reflected in 5 years usage of Barrier Film, yearly fees and florescent UV tube replacements</p> <p>Year 5 costs reflected in replacement of UV diodes, yearly fees and florescent UV tube replacement</p> <p>5 years accumulated costs reflected in usage of Thermal Film Laminate, yearly fees and florescent UV tube replacement</p>									
	O2 Depletion Using Gas										
	O2 Depletion Using Laminate										
	UV Diode Boost										
	Imaged Laminate										

Full HD Flexo and Color Matching

5

What is the CORRECT Solid Ink Density?

- Example: ISO Magenta

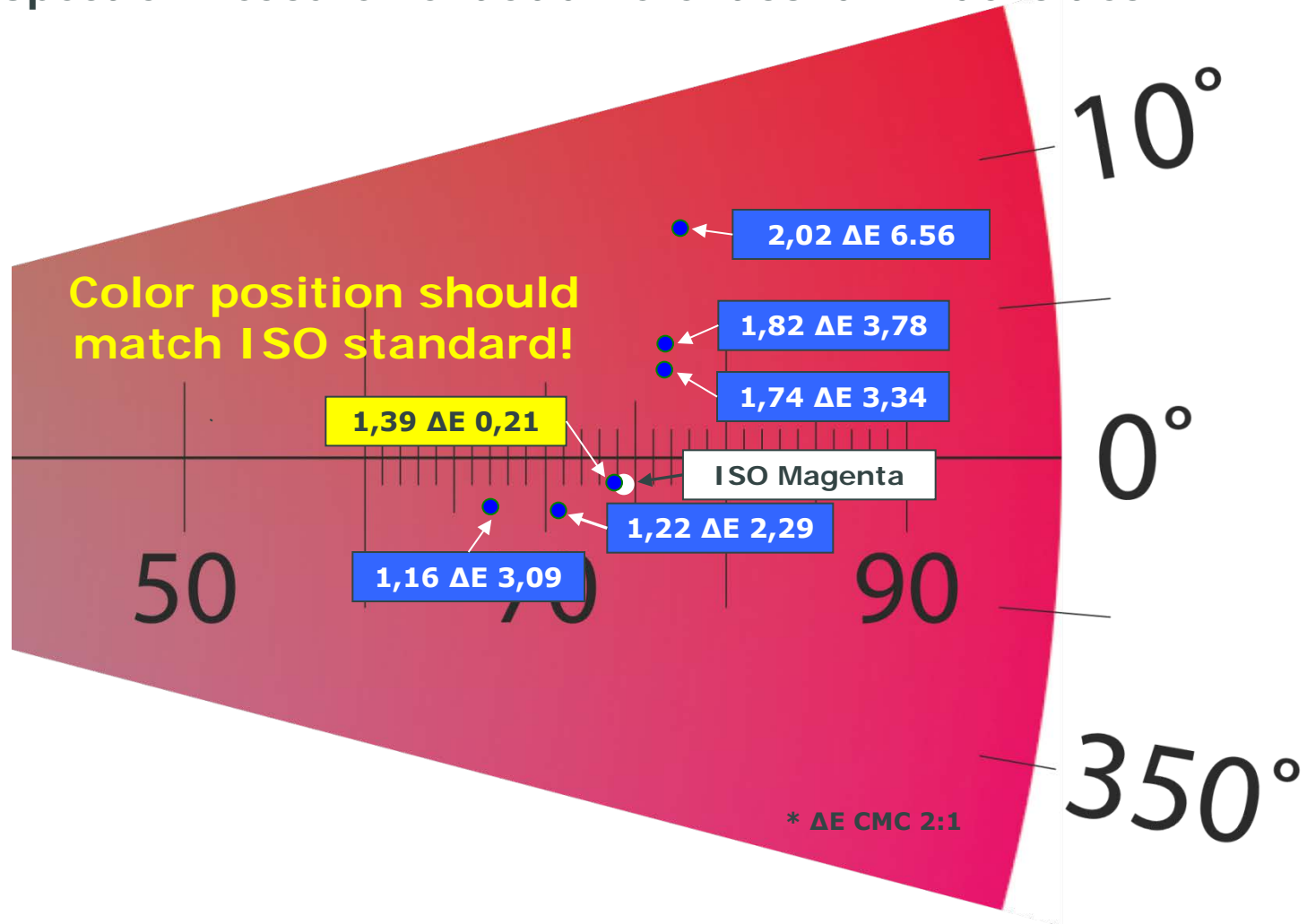


... does
Density affect
Color???



What is the CORRECT Solid Ink Density?

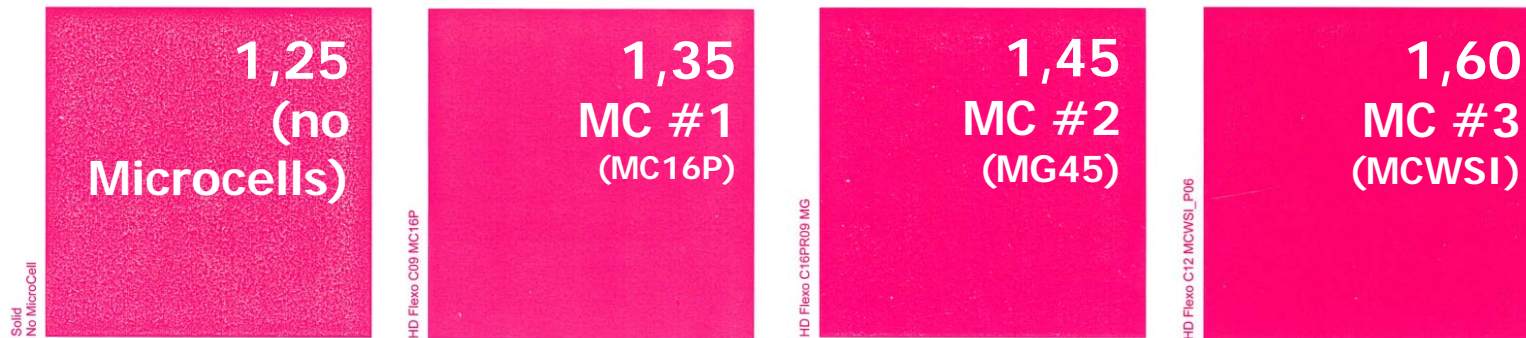
- Spectral measurement at different solid ink densities:





Select The Right Full HD Flexo Solid Screening

- **Optimal Ink Laydown** (no pinholes) for CMYK, spot colors and white
- **Select the desired ink density** w/o changing the Anilox roller:



- **Differentiate** between spot colors, white and process colors:
 - Process colors: Target SID between 1,4 and 1,5
 - Spot colors: SID as high as you get....
 - White printing: Opacity as high as you get...

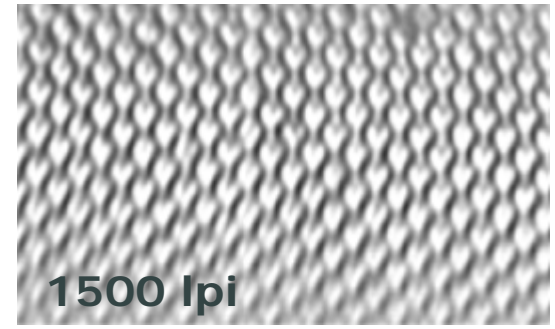
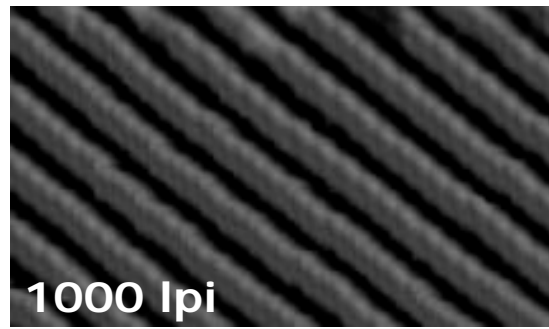
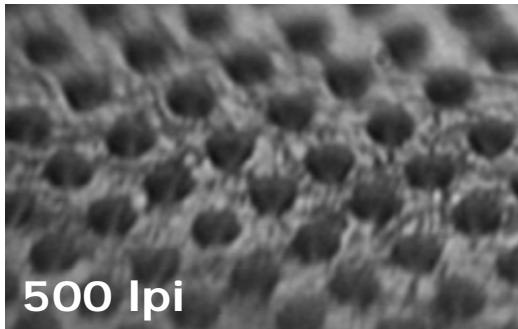
Which Full HD Solid Screening tool to use?



Or?



Full HD Flexo Solid Screening Technologies

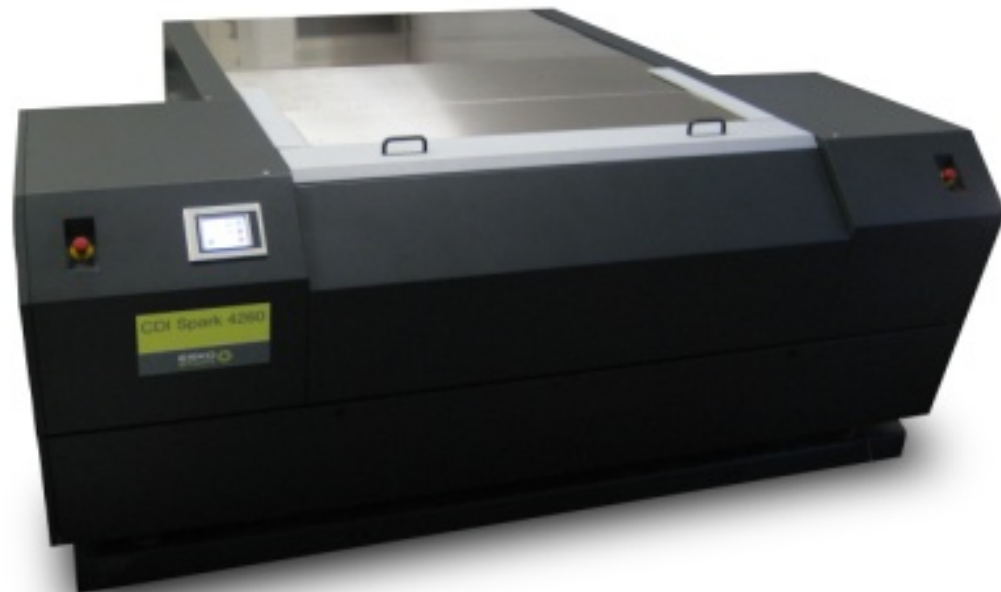


Full HD Flexo, HD Color & Automation

6

CDI FULLY AUTOMatic

- Demonstrated at DRUPA with great success
 - Very High interest from visitors
- ROI is surprisingly short
 - Increased throughput and reduced plate wastage
 - Improved handling accuracy and plate loading
 - Diode Back and Main UV exposure
 - Free-up manpower in plate room
 - One man operation
- CDI 4835 release late 2013
- CDI 4260 & 5080 late 2014

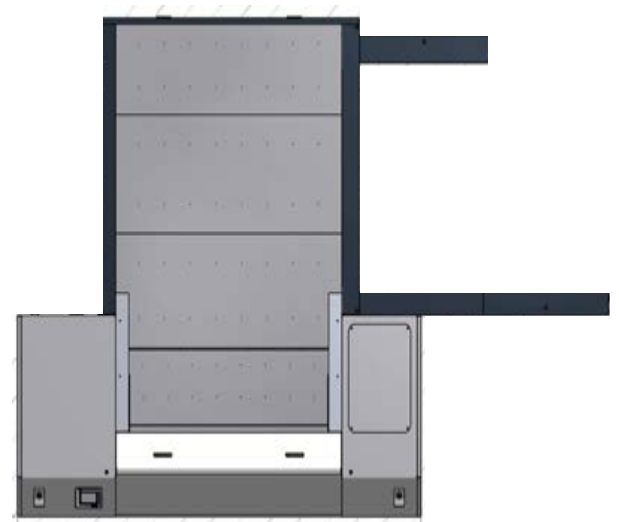


CDI FULLY AUTOMatic workflow

- lights out production

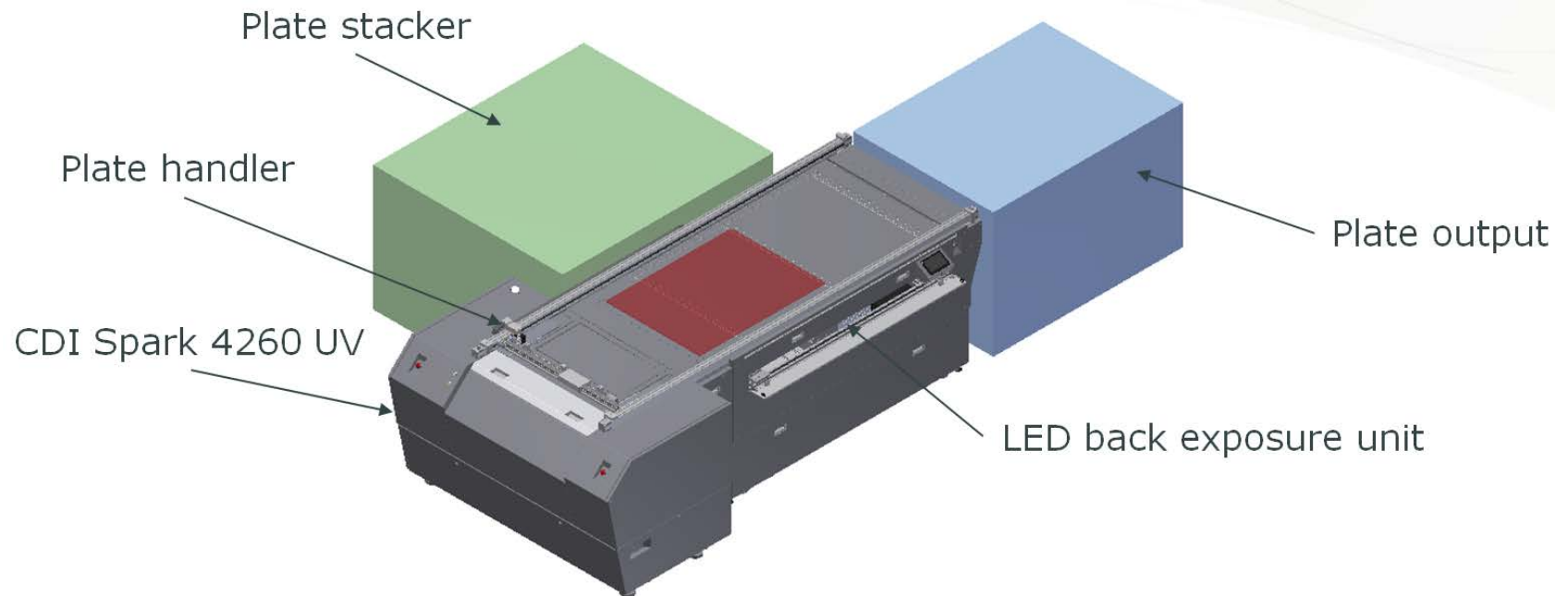
Quickest throughput at least manpower

- Manual plate loading
 - Inline Back Exposure
 - Automated plate loading
 - Inline UV Main Exposure
 - Automated unloading off drum
 - Handover of plate to plate processor
- **Highest consistency per workflow step secures quality**
- Automation brings consistency which secures repeatable quality
- Maximized machine usage and plate throughput



LIGHTS OUT - CDI

for Flexible Packaging and Label Converters



- Beta-Release in Q2-2014

ESKO*

Thank you