How to be Creative, Faster, AND Profitable!

Cori Devlin and Bob Hannum - DuPont Packaging Graphics

Flexographic Pre-Press Platemakers Association

FPPA 18th Annual Conference

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Naples, FL

Topics

- Continuing to advance flexo
    - Different dot geometries
    - Optimizing prepress to take advantage of the different dot shapes
    - Tips and tools for platemaking optimization
    - Process control requirements to assure repeatability and consistency
- DuPont offerings to support the Tradeshop

Our Objective:

Highest Quality & Highest Productivity

- Improve the highlights and enable smooth vignettes to zero
- Maintain open shadow detail
- Expand tonal range and achieve good solid ink density
- Increase consistency and repeatability on press

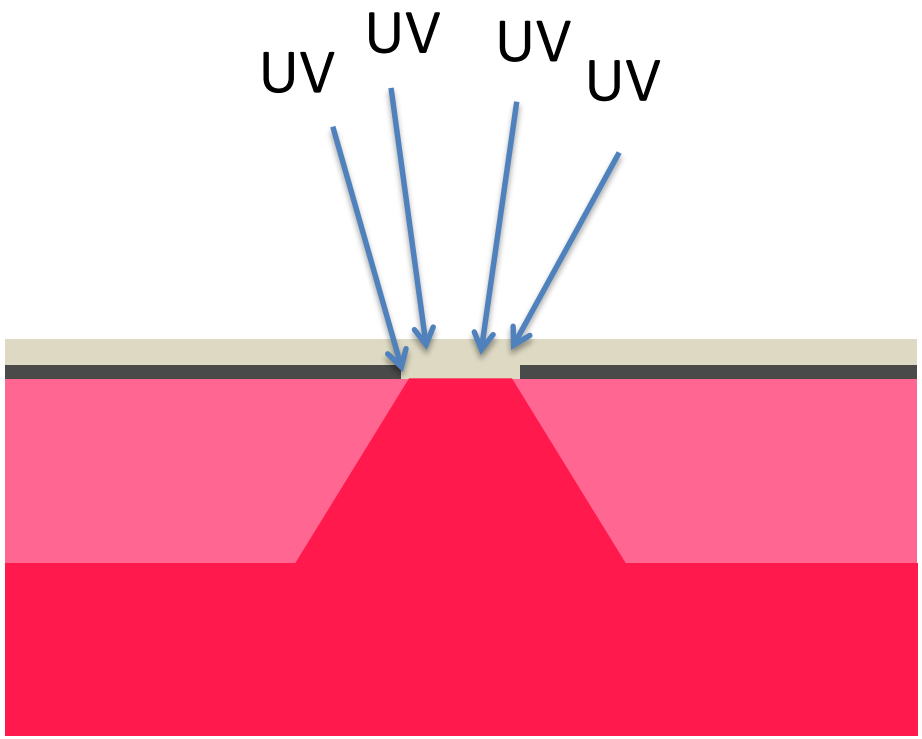
Dot Geometries

Analog Dot

Digital Dot

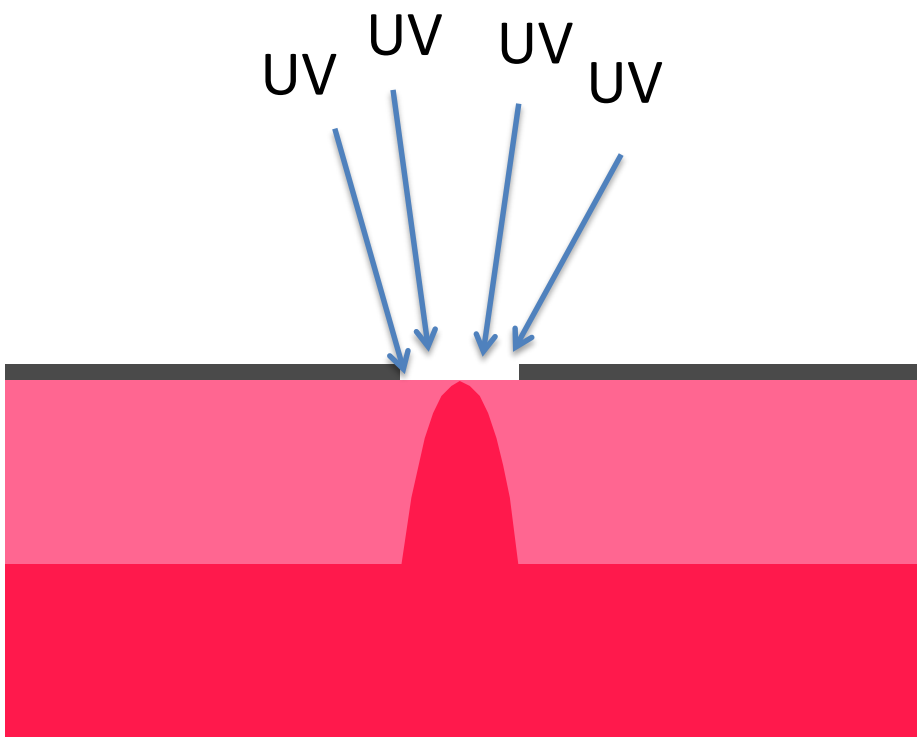
Flat Top Digital Dot

Analog Dot (Flat Top Dot)



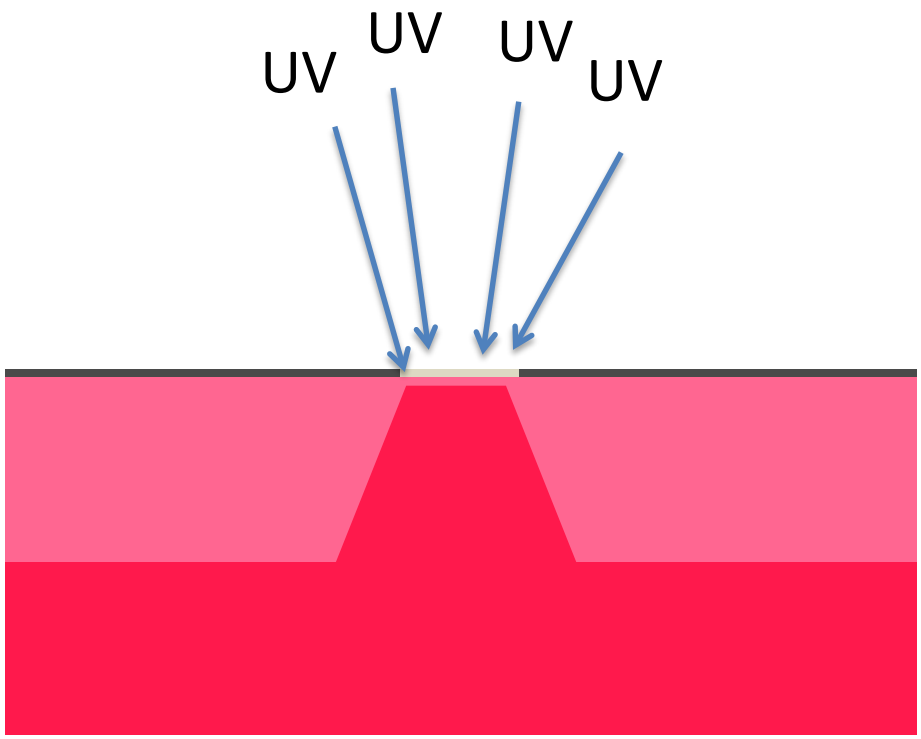
- Analog plates are made in a vacuum with a film negative
- Dot forms broad shoulders and flat top
- Requires a heavy compensation curve to compensate for major dot gain

Digital Dot (Round Top Dot)



- Presence of oxygen in standard digital workflow slows photo polymerization
- Results in smoothing of the plate surface **&** a reduction of the dot size (sharpening)
- Sharpening of dot offsets press dot gain, increases tonal range and ‘opens up’ shadows and reverses

Flat Top Digital Dot



- Absence of O_2 produces flat top & 'hybrid' shoulders
- Capable of nearly exact 1:1 reproduction
- Bump curve reduced or eliminated but some dot gain compensation may be needed

DigiCorr - DigiFlow

Controlled atmosphere exposure to create flat top digital dot

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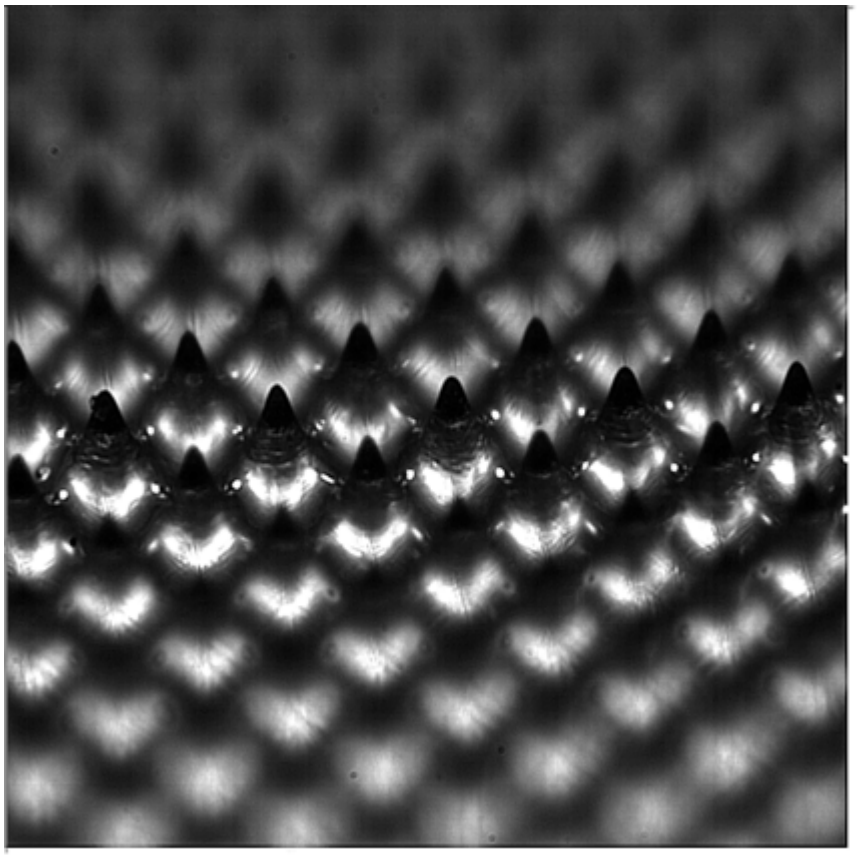
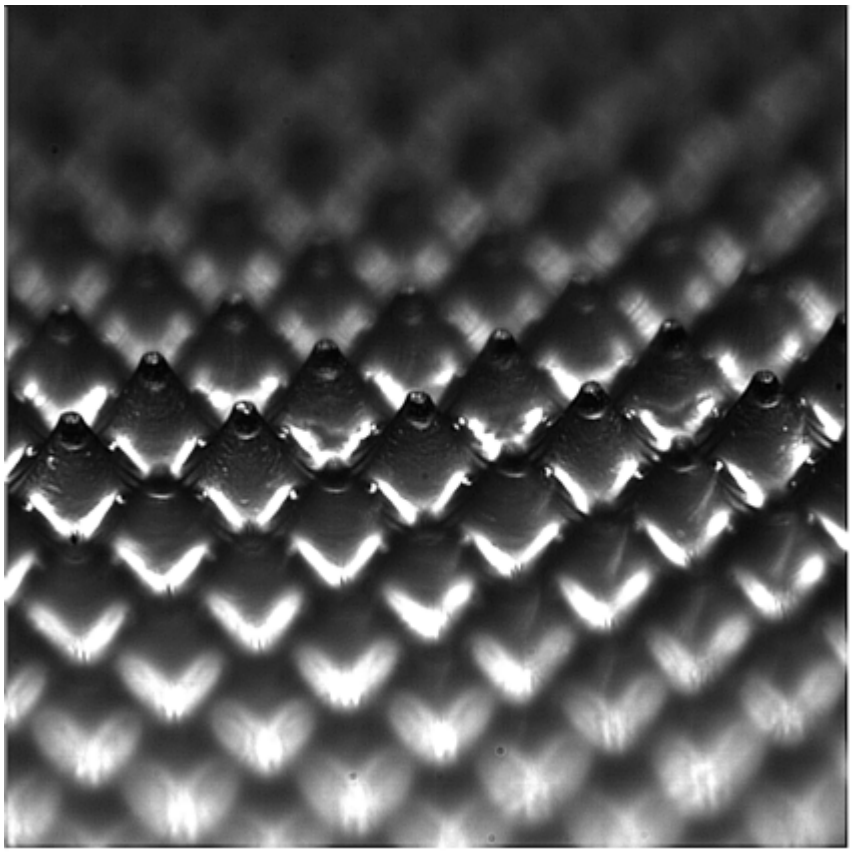
Digital Dot Geometries

Standard (RT) Digital Dot



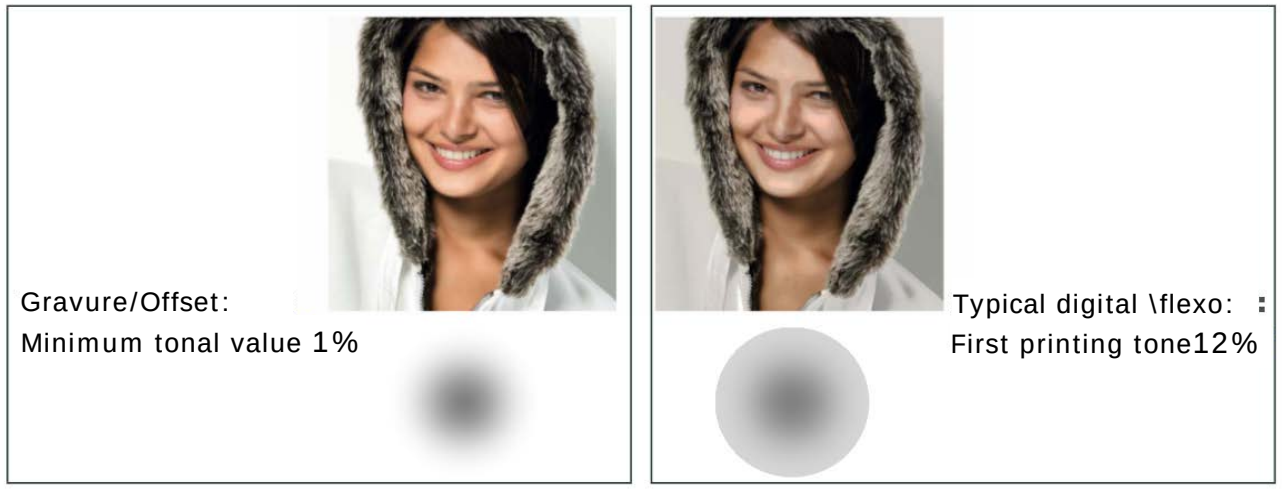
Flat Top Digital Dot



Historical Flexo Limitations

Large Minimum Tonal Value (especially at higher screen rulings)
→ low tonal image contrast, improper image appearance

Transition to Zero
→ Visible vignette edge due to too large minimum tonal values



- Flexo-Impression Challenges: Minimum dots may bend on the press!

Flat Top Digital Dot

- Advanced screening tools well suited to flexible packaging
- Can further push the boundaries of quality
- Requires press profile for new set of tools

Image Preparation

Minimum printing dot of 2% - 5% required to fade to zero

Requires good printing conditions, fine anilox and careful impression settings

Setting a minimum dot ‘limiter’ can prevent a harsh break

Carefully set FM→AM transition points

Image Preparation

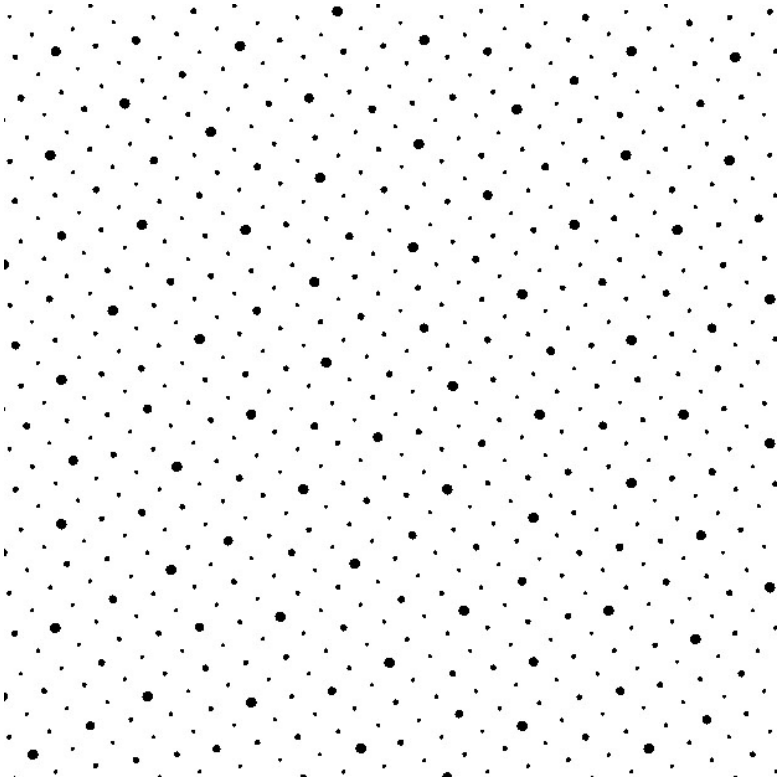
Be realistic about printing conditions

If high quality expectations, the press should have a profile

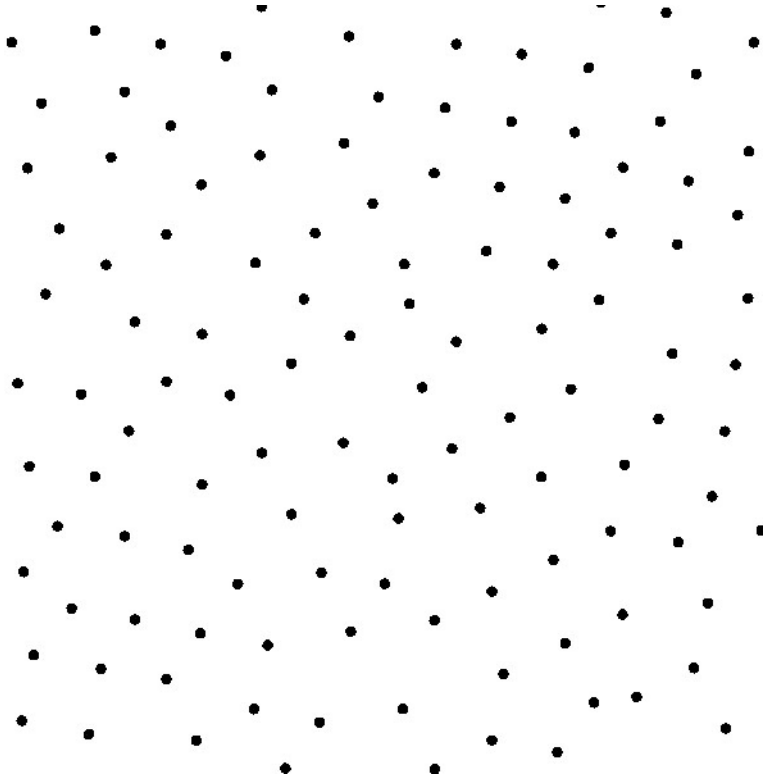
Carefully prepare images to align with those press capabilities

A well-done 120 LPI screen is preferable to a poorly done 150

Highlight Screening



HD56LV



HD56MV

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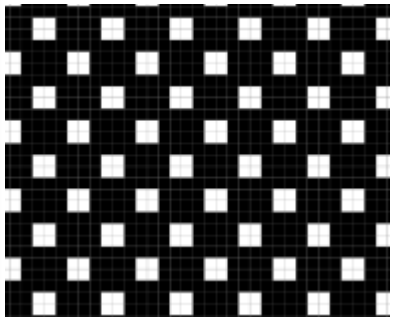
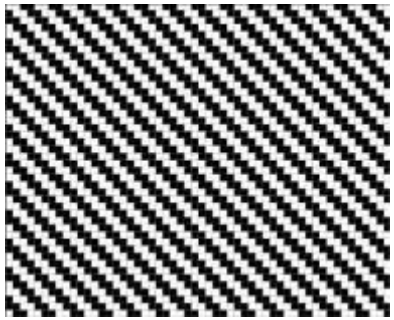
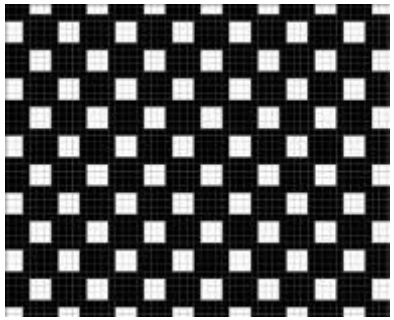
Solid Screening Technologies

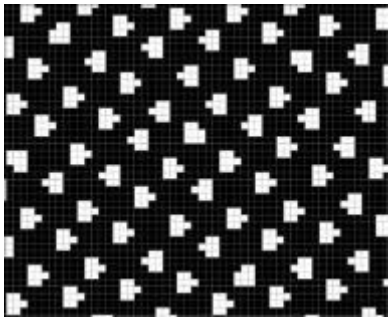
Used in a Standard Digital Workflow

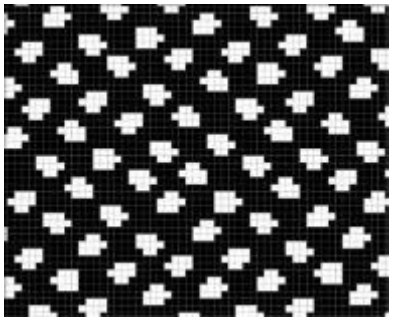
Used in flat top DigiFlow Workflow

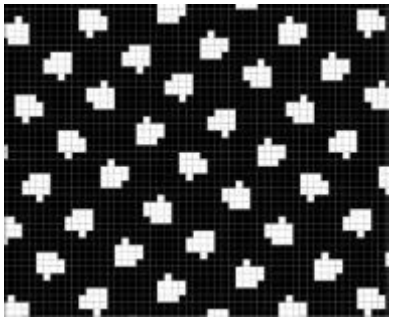

MC2x2N

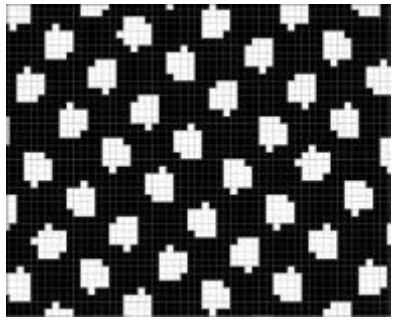

MG 24_45


MC3x3 45

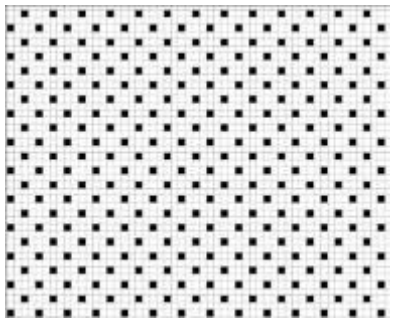

MC07P H

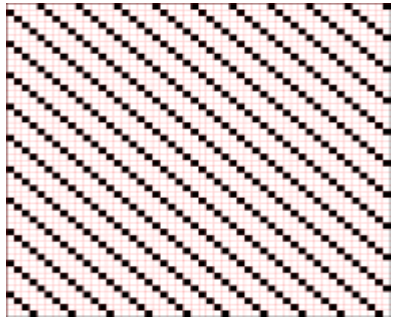

MC09P H


MC12P


MC16P

Used in flat top DigiFlow workflow


MCWSI


MG45


MG34

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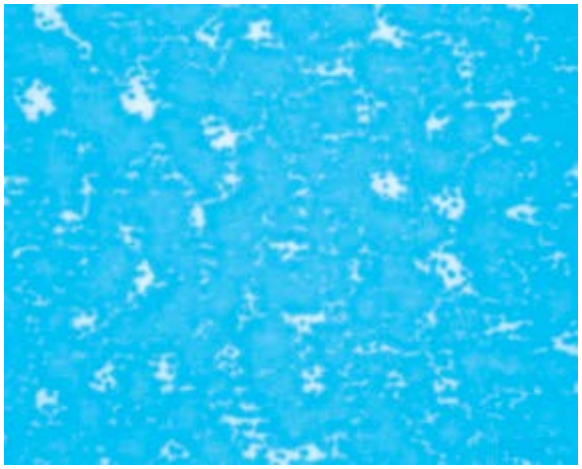
Example of solid screening benefit



Standard unscreened solid
Density = 1.15

	1.16
	1.14
	0.97
	1.31

Solid MCWSI Screened
Density = 1.74

	1.74
	1.60
	1.14
	1.91

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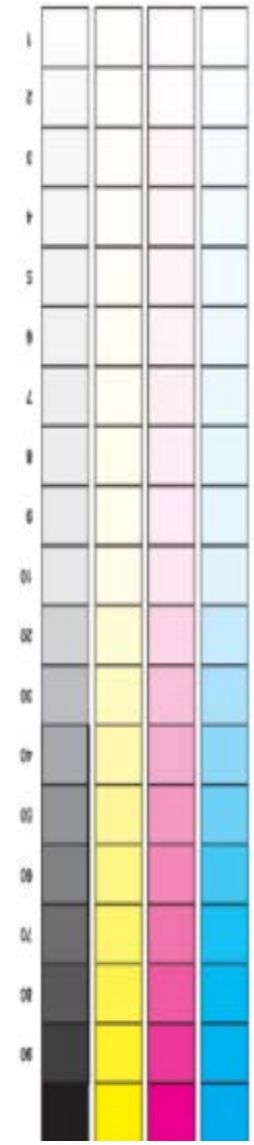
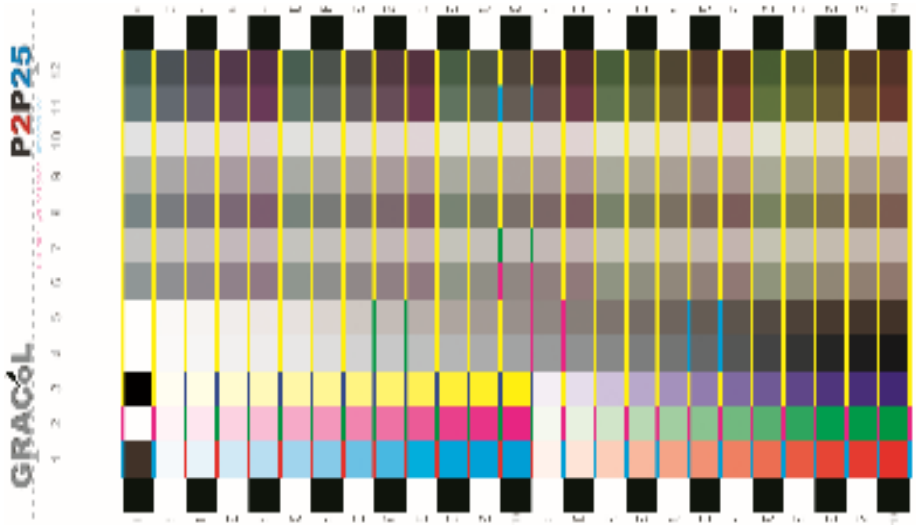
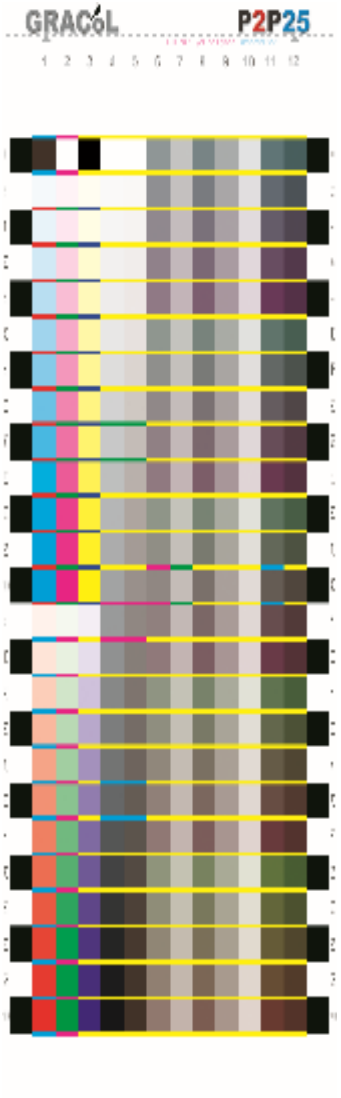


Profile Press

Press profile under standard print conditions

- Ink, anilox, tape, plate, etc.
- “Run to the numbers” not to a pleasing reproduction of a subject or scale





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Selecting Proper Min Dot

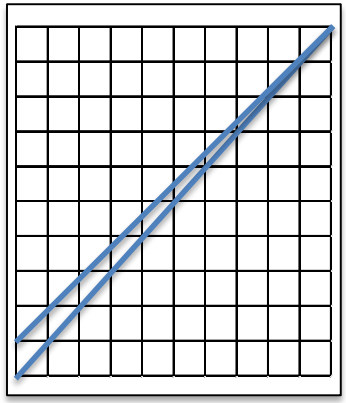
FTD = 1.2%

The right min dot is the smallest correctly formed dot that can stand up to the pressure of printing.

- Standard workflow digital dots sharpen (shrink) due to effects of O2 during plate exposure and require a compensation (bump) curve. The bump curve enlarges the mask opening to ensure that minimum dots form at full print height.

SD = 3.5%

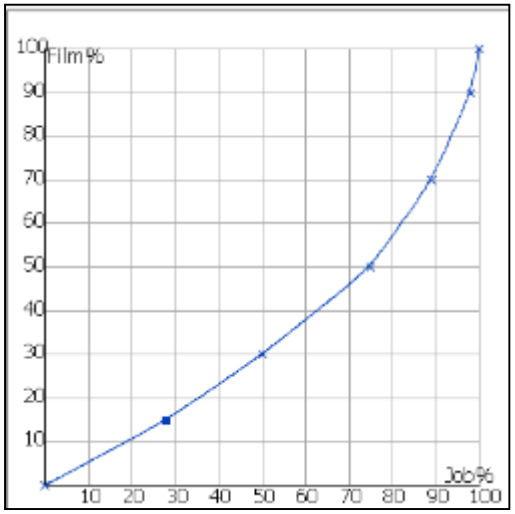
- Flat top digital dots are 1:1 so make sure you can hold & print small enough min dot at chosen screen ruling



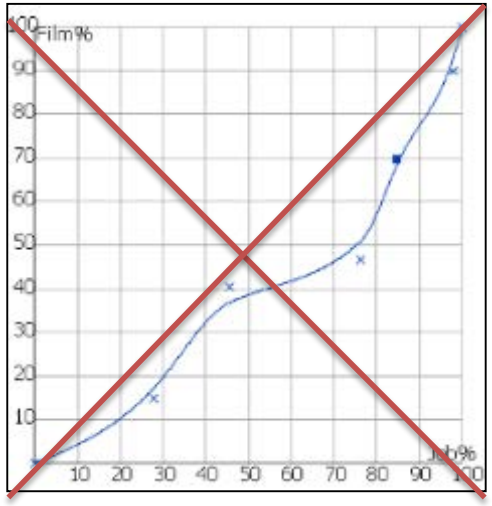
Creating Curves

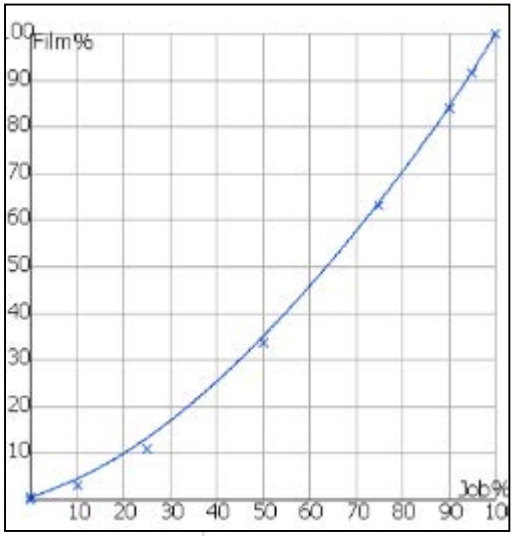
- Regardless of dot profile, curves are needed to compensate for optical and mechanical press gain.
- The effect of oxygen on digital dots provides a natural cutback for dot gain.
- The 1:1 reproduction of flat top digital dots requires a greater compensation curve than standard digital to keep from printing “too dark”.
- Curves are generated by printing tone scales and comparing the predicted result with the actual result.

Curves



Make sure the curve is smooth and is always rising





A Steeper Curve = Greater Contrast

Any change in the curve will affect tonal values and contrast.

Example: If you need more contrast in the highlights make the curve steeper in the highlights.

Platemaking QC tools to assure repeatability and consistency

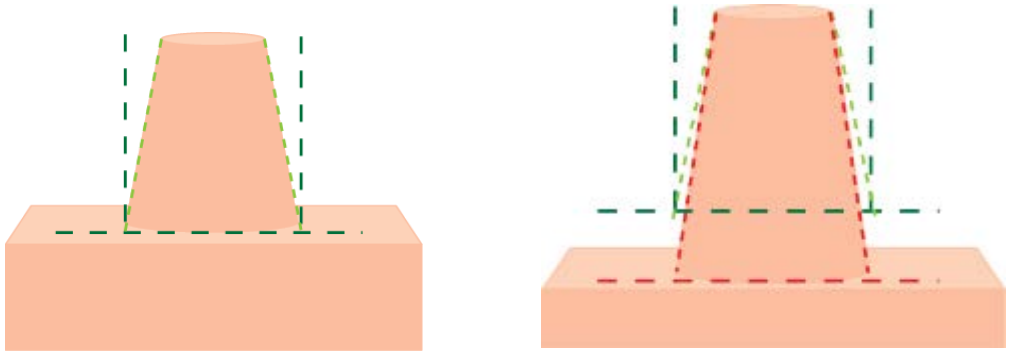
Check Relief on plates

QC control targets

- Different tolerances/measurements needed for different workflows
- Measure targets

Relief

- In accordance with FIRST standards we recommend .018-.022 inches of relief, for thin digital plates.
  - For screened highlight dots and small details to properly form and hold on the plate
  - Dots have a stable base to prevent them from folding over under pressure

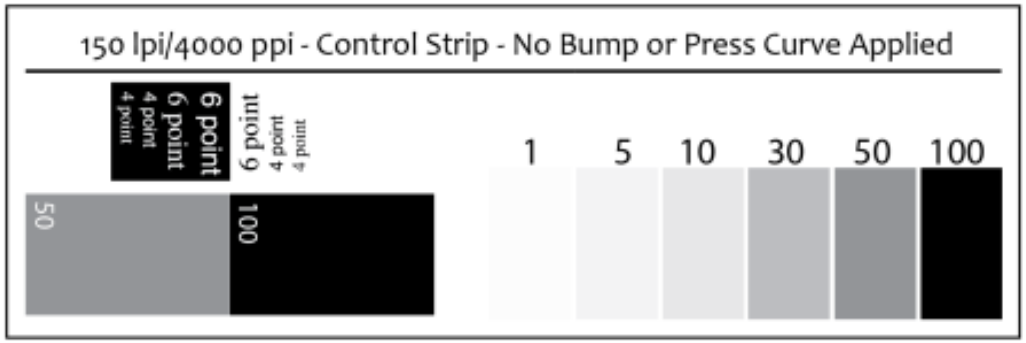


QC targets

Gray Scale Target

Highlight Dots

1,5,10,30,50% dot sizes



Avoid Dirty Printing

- Dots that are too small, isolated or improperly formed can contribute to dirty print.
  - Below the min. diameter to reach full print height
  - Isolated dots in image or vignette highlights
  - Standard digital dots too small to take impression
  - HD screenings with incorrect support dots

Both standard digital and flat top digital are capable of outstanding print quality

To achieve consistently highest quality standardize your printing, your dot profile and your prepress for consistent quality and productivity.

- Dot geometry
- Screen Ruling
- Screening program
- Anilox ruling and cell volume
- Tape
- Plate type

DuPont Solutions to Support You and Your Customers

Faster, Profitable and Creative!!

Flexographic Pre-Press Platemakers Association

Faster Solutions

Flexographic Pre-Press Platemakers Association

Productivity & Sustainability in a Large Format

- Productivity
  - Highest productivity of any thermal processor
  - Rugged design for high volume applications
  - Up to 3 – 50x80 plates per hour
- Quality
  - Excellent dimensional stability
  - Outstanding cleanout
  - Smoother floors
- Flexibility
  - Gauges from .045” to .112”
  - Plate sizes from 24x30 to 50x80
- On-line support
  - Remote monitoring of machine performance
  - Remote diagnostic and resolution

Cyrel® FAST 3000 TD

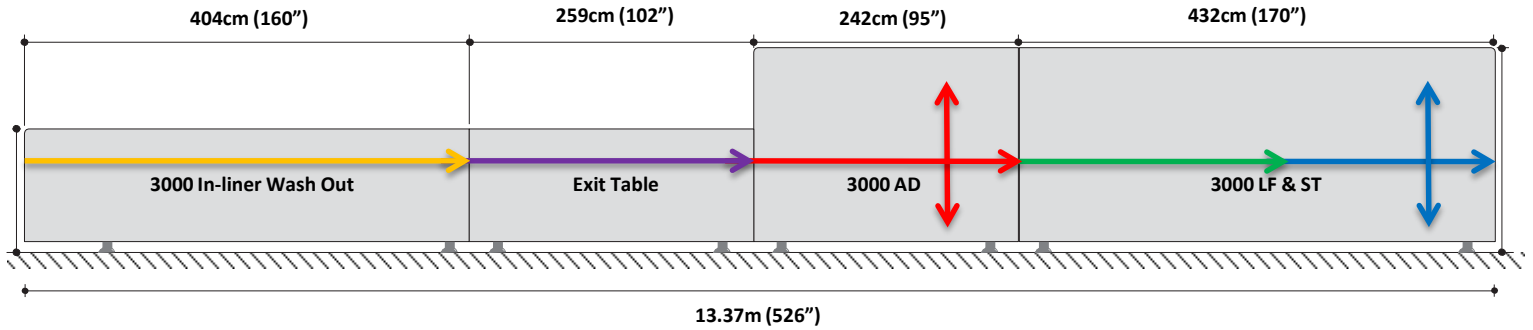
The Modular Concept of the 3000 InLiner

3000 In-Liner – 3000 BP+3000 AD+3000 LF+3000 ST
3000 BP-AD – 3000 BP+3000 AD
3000 BP – Batch & Incremental Processor
3000 AD – Automatic 8 Draw Dryer
3000 LF – Combination UVA & UVC Light Finisher
3000 ST – 8 Draw Stacker

Simple, reliable plate path

Simple, efficient plate path, with less plate movement between stages.

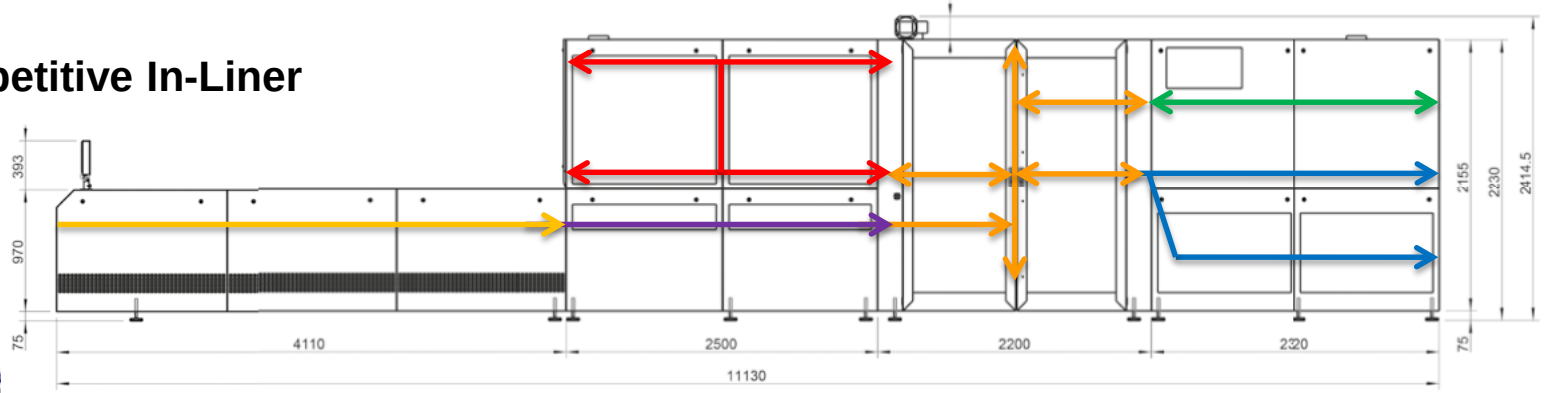
DuPont 3000 Modular In-Liner



Wash Out	Exit	Drier	LF	Stacker

	Drier	Transit	Transit	LF
Wash Out	Exit	Transit	Transit	Stacker

Competitive In-Liner



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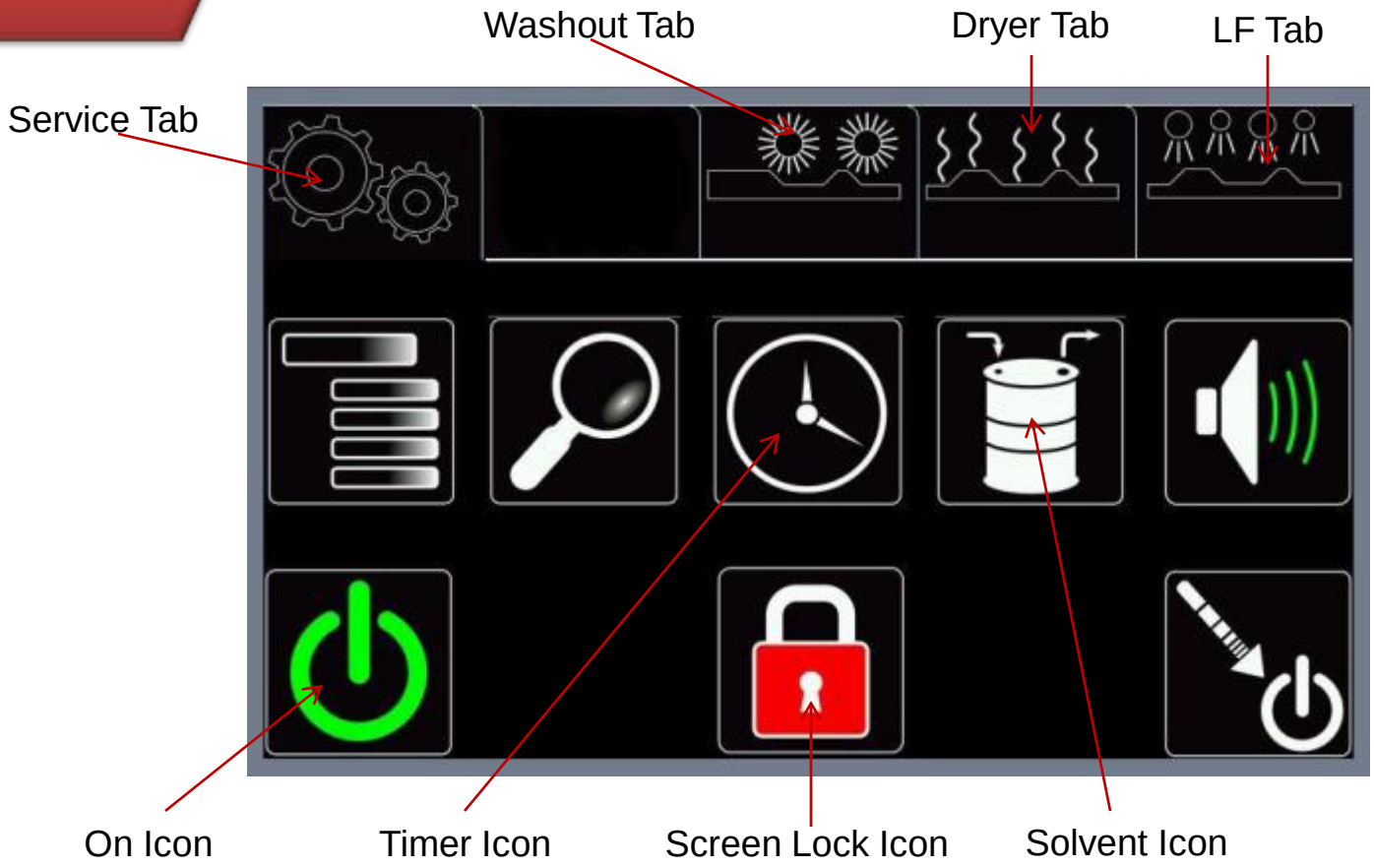
Ease of Use - Operation - Service

Ease of Use

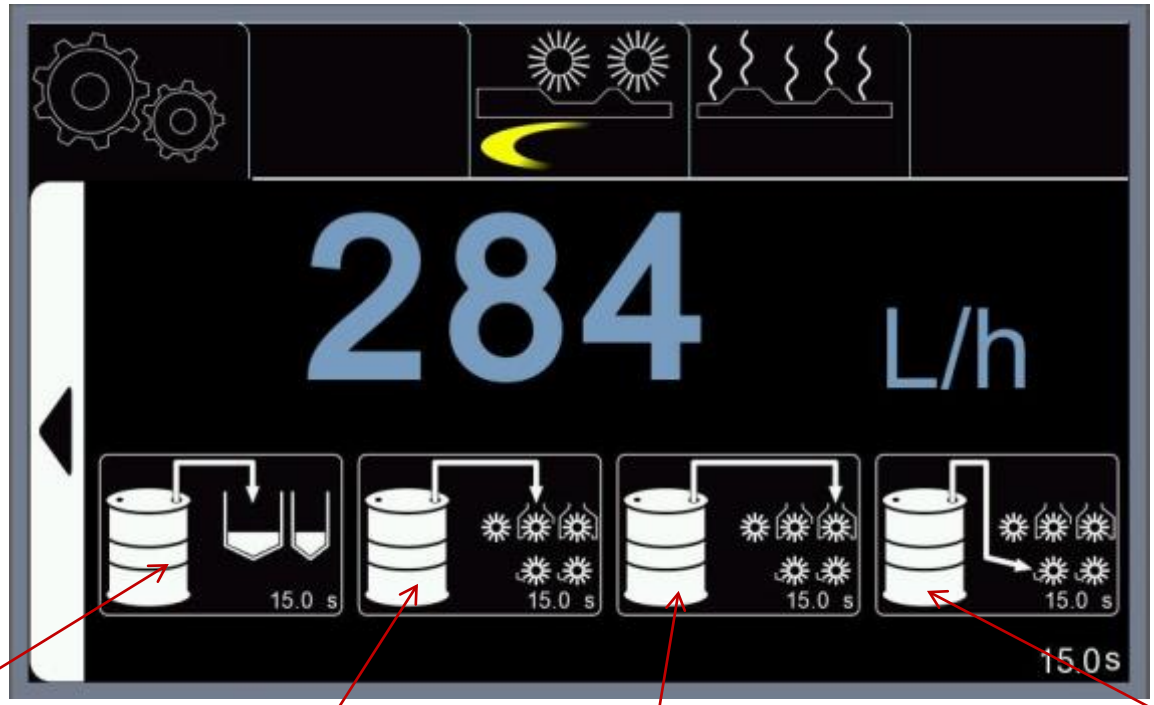
- **Word –free** pictogram operator screen.



Ease of Use - Operation - Service

Operation

- On-screen fresh solvent flow **control**.



Main wash tank filling

Cleaning brush

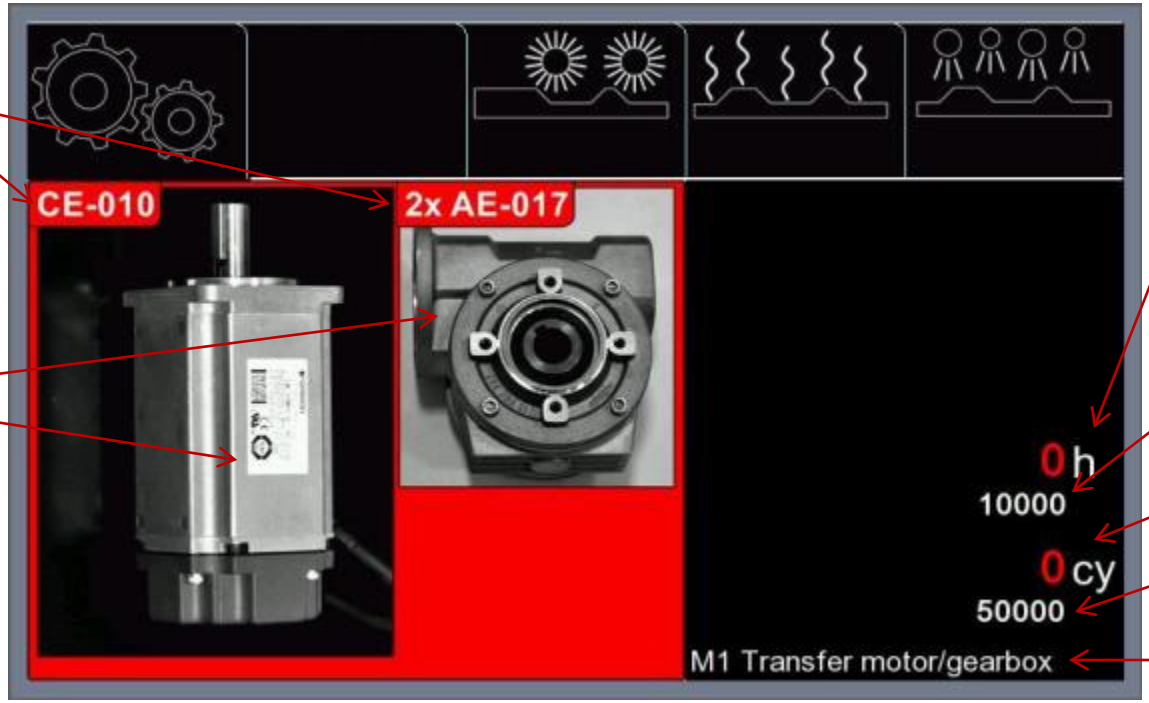
Wiping brush cleaning cycle

Underside plate cleaning brushes

Ease of Use - Operation - Service

Service

- Parts replacement advanced warning indicator (part number, description, duty cycle & image displayed).



Part Number

Part Illustration

Elapsed Hours

Target Hours

Elapsed Cycles

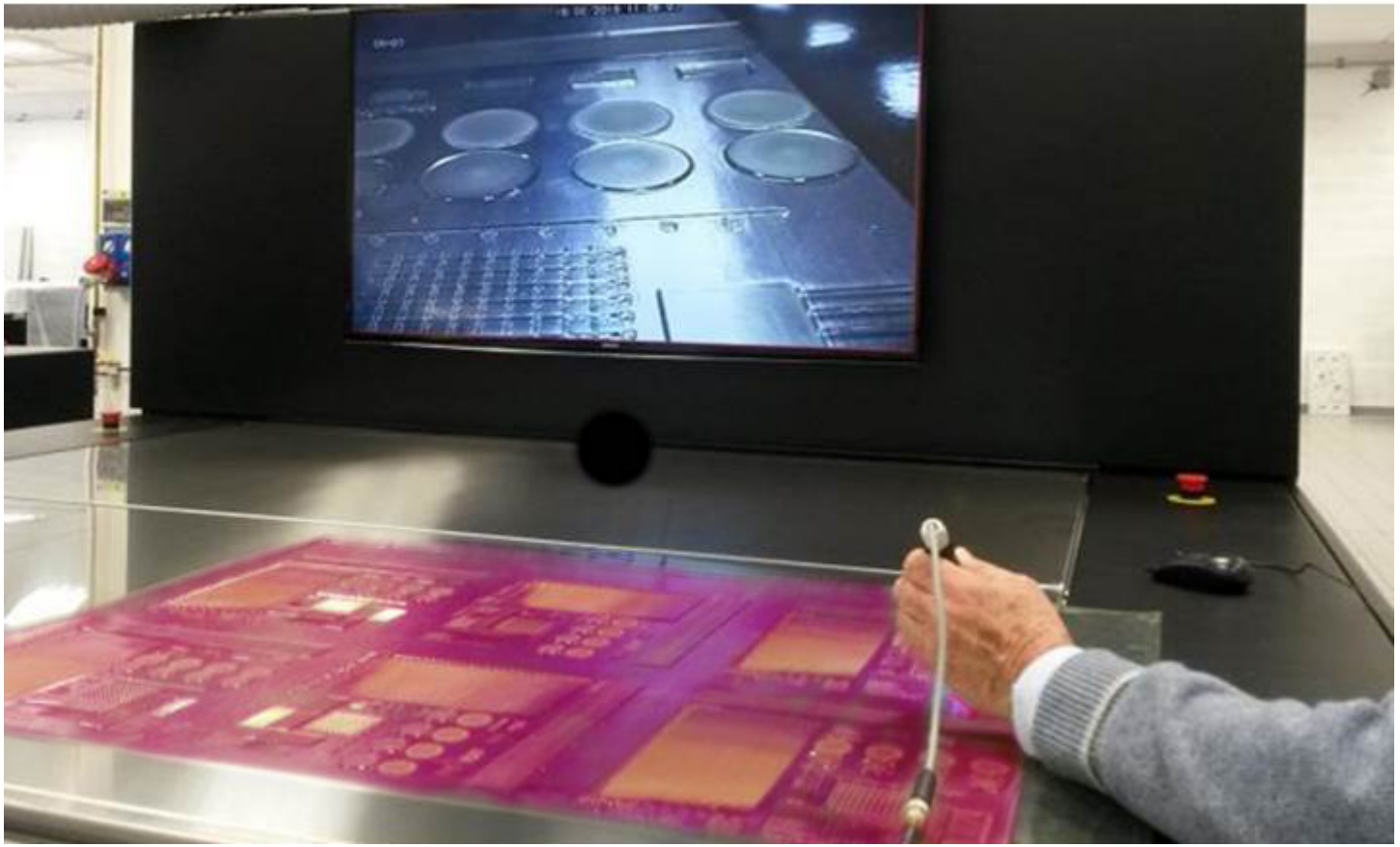
Target Cycles

Part Description

Ease of Use - Operation - Service

Service

- One **remote camera** on long cord that can be moved around to a "troubled area" for service.



Cyrel® Modular 3000 Inliner Video

Cyrel® In-Liner Video

Flexographic Pre-Press Platemakers Association

Customer Feedback

Profitability

- Labor savings -¾ of a person
- Less solvent used – automatic viscosity control
- Less service calls/downtime – no calls in first 7 months

Faster

- More plates in an 8 hour shift
- Operators can multi-task more efficiently

Profitable Solutions

Flexographic Pre-Press Platemakers Association

A Chance to Raise Your Price!!

- The following slides will highlight an opportunity to grow revenue
    - Provide your flexible packaging customers an ink savings solution
    - Educate them on how to do this
    - Charge for this service by setting expectations ahead of time

The Test

Printer decided to do a direct comparison on a live press run

- They would run their normal configuration of process and line plates on live job, but would try three different white backer plates for long job on clear poly (750,000 linear feet)
- They changed the white plate every 250,000 feet and started a fresh 500 pound barrel of white ink at every white plate change.
- They then weighed barrels when done and calculate how many feet per pound
- Note: This printer historically had run DPR for process plates and DPL for line colors

3 Plates tested: All plates made by same Tradeshop

1. Cyrel® DPL with Esko Groovy Screening.	This is what the printer has historically used for their white plates
2. A competitive plate with solid screening	This had been promoted as the highest solid ink density solution
3. Cyrel® DPR w/ DigiFlow & Esko Pixel+ / MCWSI	This was the recommendation of the Tradeshop

Results from first test

The printer's baseline was Cyrel® DPL with Groovy screening.

- This was the white plate configuration that they had used for years
- The competitive plate had a 2% better run length and a 1% improvement in contrast ratio compared to the DPL baseline.

Cyrel® DPR with DigiFlow and Pixel Plus using MCWSI screening *significantly outperformed* both the baseline and the competitive 'high volume' alternative

- DPR in flat top profile with solid screening had 13% better run length with 4% increase in contrast ratio compared to baseline of DPL.
- DPR in flat top profile with solid screening had 11% better run length with 2% increase in contrast ratio compared to the competitive plate.

Initial White Test

The Printer's Baseline

- The printer has historically used DPL imaged with Esko Groovy screens for their white plates and line colors.
- They used a 360 line 5.8 volume anilox
- They achieved an average contrast ratio of 57.61 over the run
- They produced 542 linear feet of substrate per pound of white ink used.

DuPont™ Cyrel® DPL White

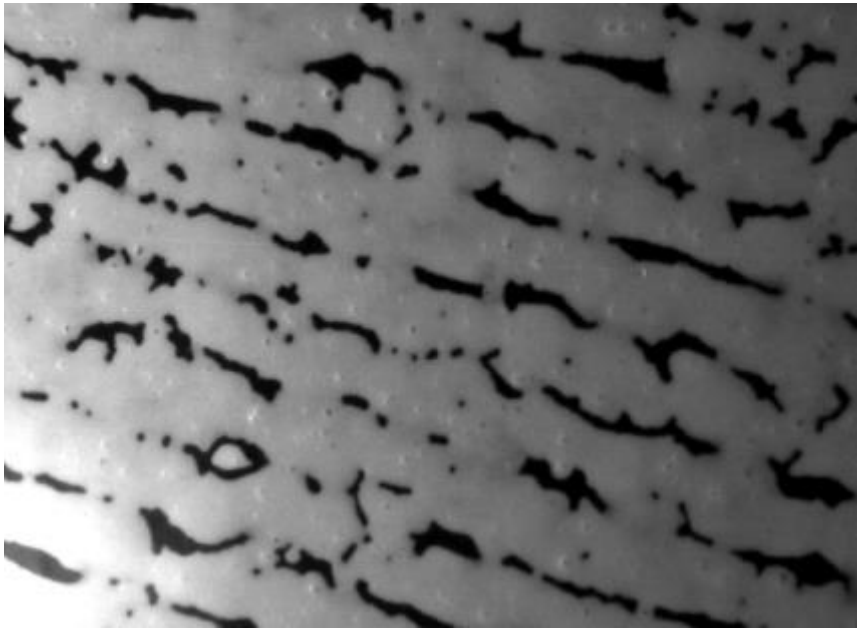


Photo of white ink laydown on substrate.

Initial White Test

Alternative #1

- The competitive plate was imaged in a flat top dot workflow with solid screening.
- They used a 360 line 5.8 volume anilox
- They achieved an average contrast ratio of 58.31 over the run
- They produced 551 linear feet of substrate per pound of white ink used.

The Competitive Plate

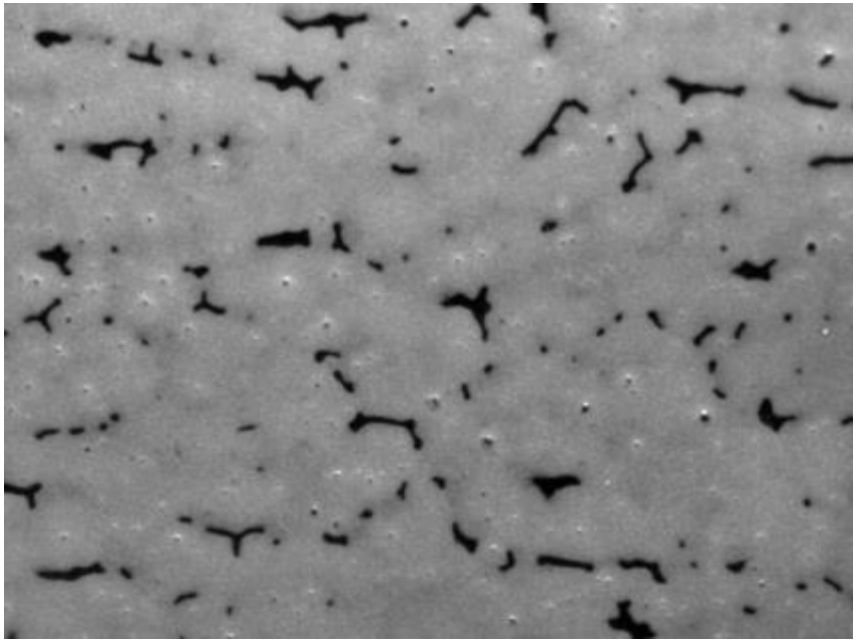


Photo of white ink laydown on substrate.

Initial White Test

Alternative #2

- The Cyrel® DPR plate was also imaged in a flat top dot workflow with solid screening, using the Cyrel® DigiFlow system and Esko Pixel+ screening (MCWSI)
- They used a 360 line 5.8 volume anilox
- They achieved an average contrast ratio of 59.68 over the run
- They produced 612 linear feet of substrate per pound of white ink used.

DuPont™ Cyrel® DPR

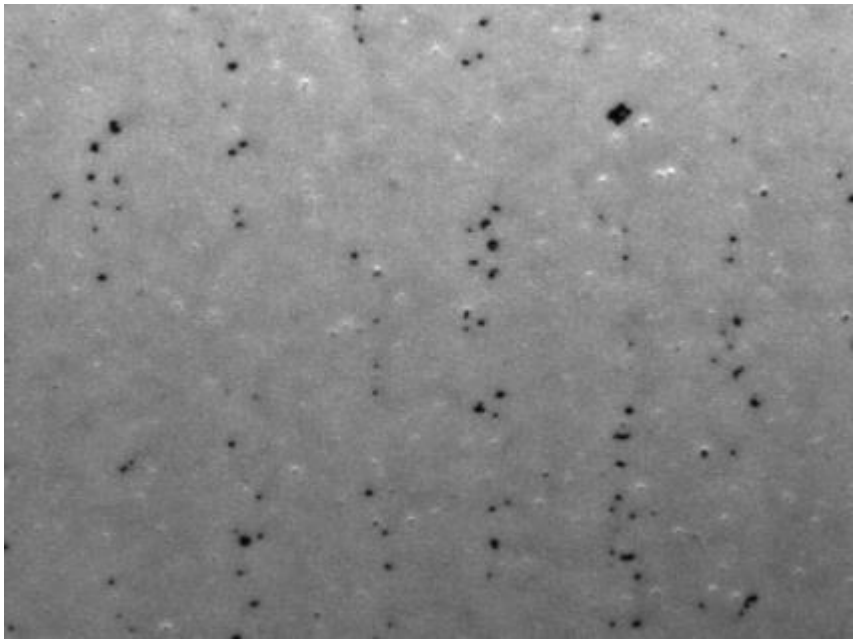


Photo of white ink laydown on substrate.

Results from first test

White Test #1

Feet used	245,646		254,440		279,650
lbs left over	47		38		43
ft/lb	542.2649		550.73593		611.9256
lbs of Ink Used (?)	453.00		462.00		457.00

DPL Plate + Groovy (original)		Competitive Plate		DPR with Pixel Plus/MCWSI	
Roll #	Contrast Ratio	Roll #	Contrast Ratio	Roll #	Contrast Ratio
1	57.19	13	58.26	25	59.06
2	57.11	14	58.15	26	59.27
3	57.61	15	57.25	27	58.82
4	57.11	16	57.67	28	59.49
5	57.12	17	58.61	29	58.99
6	57.94	18	58.00	30	59.82
7	58.17	19	58.97	31	59.75
8	58.26	20	59.20	32	59.76
9	57.95	21	59.62	33	59.99
10	58.65	22	56.14	34	60.06
11	57.47	23	58.92	35	59.43
12	56.73	24	58.92	36	59.66
				37	60.38
				38	60.99
DPL Avg. Contrast	**57.61**	*Compet. Avg. Contrast*	**58.31**	*DPR Avg. Contrast*	**59.68**

Results from April Test

Feet printed	245,646		254,440		279,650
Pounds white ink used	453		462		457
Printed Feet / pound	**542**		**551**		**612**
		Competitive Improvement vs. DPL Baseline	**102%**	DPR - Pixel + - MCWSI Improvement vs DPL	**113%**
				DPR - Pixel + - MCWSI Improvement vs Competitor	**111%**

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Cost Savings To Printer = Profit Opportunity for Tradeshops

Printer/Converter			
	Yearly Ink Cost	Average Ink Saved	Annual Savings
DuPont	$2,500,000	8%	$ 200,000
Competitor	$2,500,000		

- White ink $1.85 lb.
- Black ink $2.85 lb.
- Y, M, C ink average $5.00 lb.
- Annual spend on ink and solvents is $3.0 MM, of which $2.5 MM is ink

Ink costs and savings above are actual data supplied by printer involved in study

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Creative Solutions

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Market Background

- White ink is among highest volume of all ink colors. In addition to use as a “backer”, white also becoming a common ‘design’ color.
- In last 12 months this has become a ***hot topic***
  - Brand owners looking best possible opacity to ensure good color contrast
  - Printers looking to satisfy need without negatively impacting cost or productivity

Balancing the Printer's Needs

Consolidation of print decks

- Not uncommon to lay down two whites to get opacity and smoothness required while maintaining press speed (drying)
- Complicated packaging may require more specialty colors, forcing the printer to reduce to a single white plate.

Improved opacity and uniformity of coverage

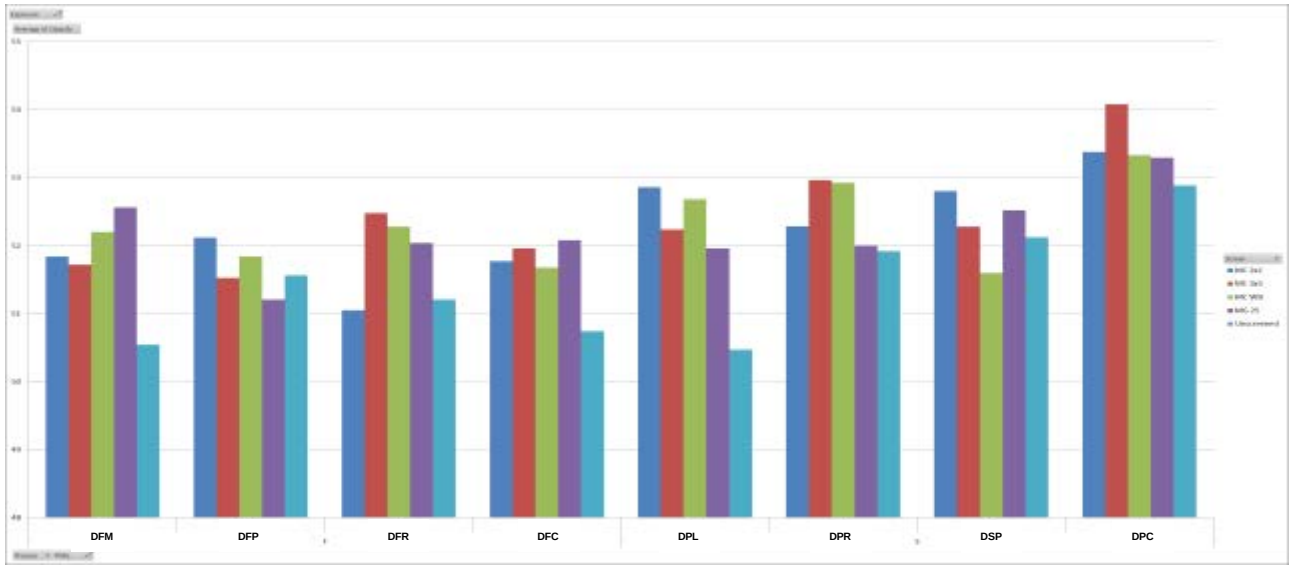
- Maximum image quality and print contrast require a smooth laydown of a high density white ink. This becomes increasingly challenging as printers move from two decks to one.

Cost Containment

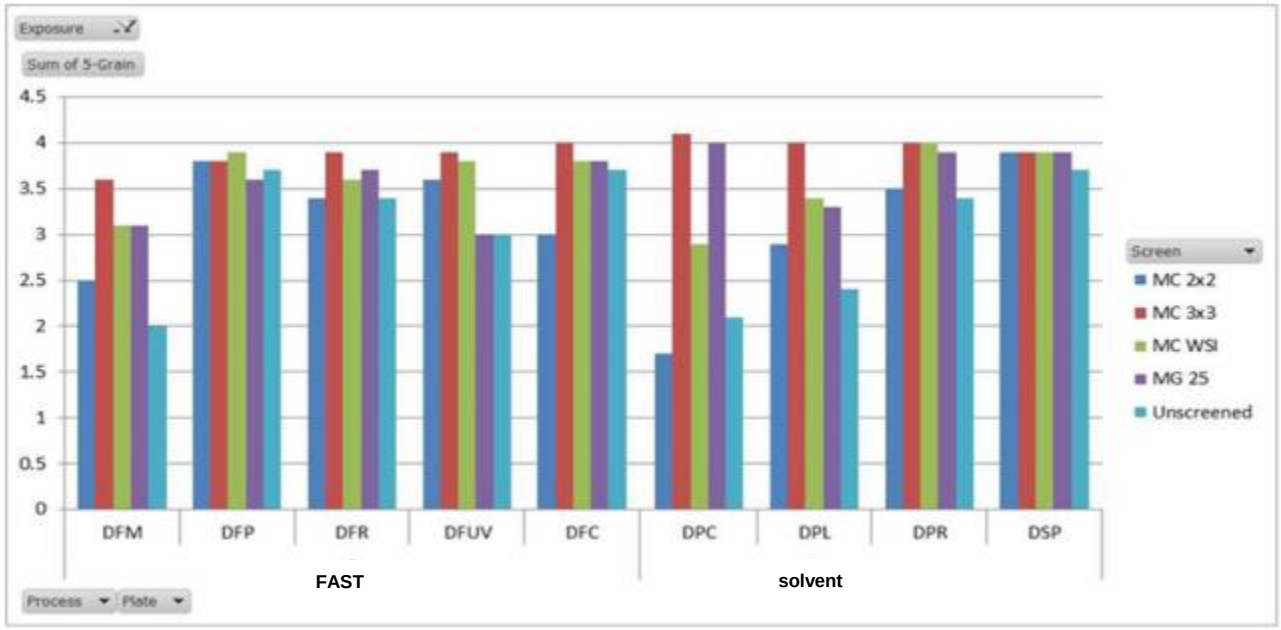
- Printers need ways to cut overall ink consumption while still hitting their opacity standards and satisfying customer expectations.

Extensive Testing

Opacity test results in DigiFlow flat top digital workflow (higher is better)



Mottle test results in DigiFlow flat top digital workflow (lower is better)



- Flat top dot (DigiFlow) workflow provides best overall results
- Solid screening improves performance of virtually all plates
- Opacity alone is not sufficient to judge performance
- Mottle can be measured with Betaflex Pro or visually compared
- You're looking for combination of high opacity and low mottle
- Smooth surface low durometer generally best
- DPC in flat top best overall performer

Marketing Plan

- **Expand DPC to include .045 gauge along with existing .067 & .107 gauges**
- **Introduce FAST process version DFC in .045, .067 & .107 gauges**
- **Assist customers with process to optimize their *off the shelf* solutions.**
  - Tape
  - Screening
  - Plate type
- **Revised DPC TDS & new DFC TDS on www.cyrel.com/na**

Summary

- DuPont has the technical resources, equipment and plate technology to help you be more creative, do things faster, and become more profitable.

And finally . . . .

Look for surprise announcement on next generation Cyrel® at FTA Forum

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Thank you!

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