

March 2019

DuPont™ Cyrel® DLC – More Ink, Less Crush!

Bob Hannum



Flexographic Pre-Press
Platemakers Association



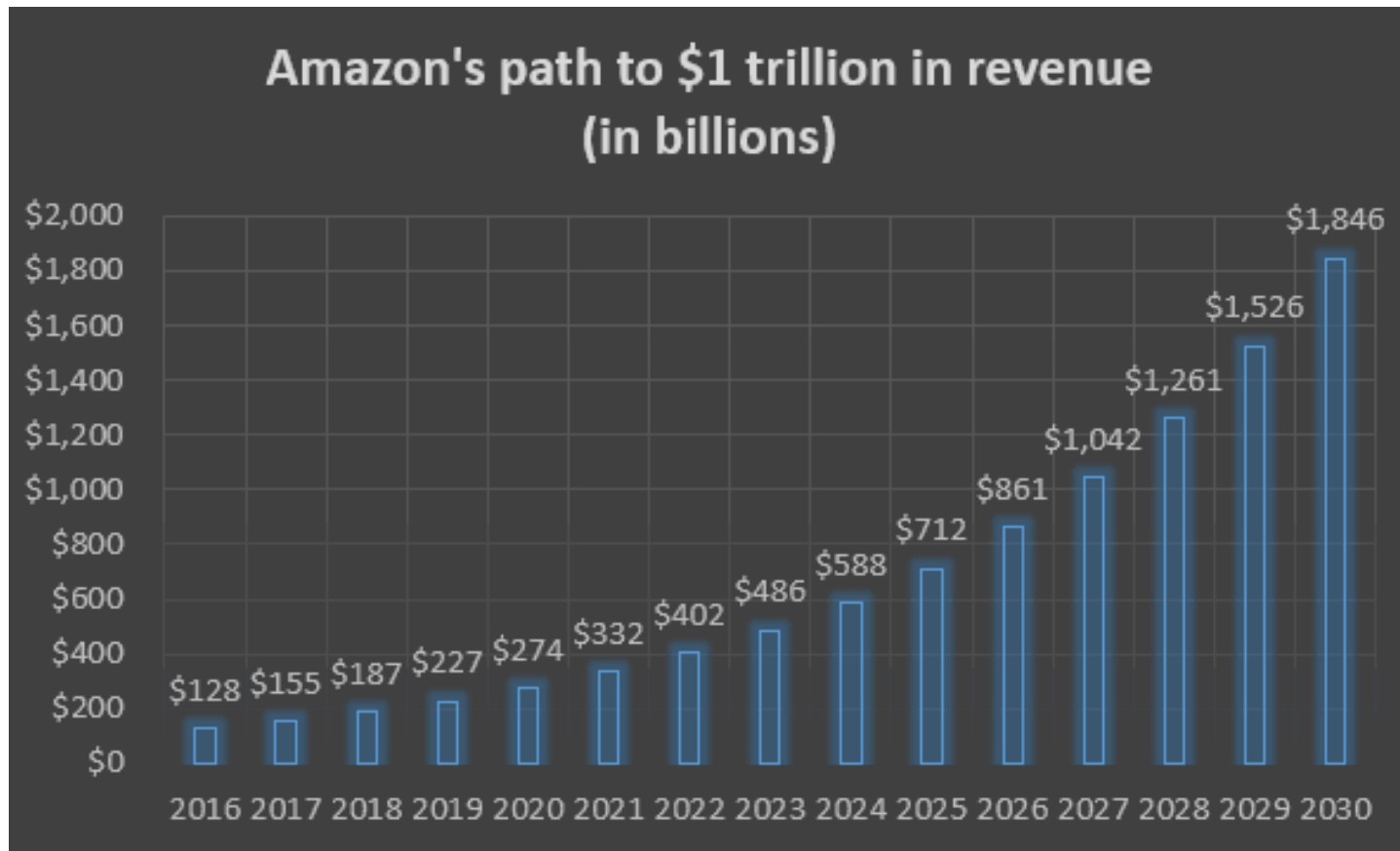
CELEBRATING
45 Years
DuPont™ Cyrel®

FPPA 22nd Annual Conference

March 24-26, 2019
Scottsdale, AZ



- Industry trends / update
- Value of DLC – DuPont's new soft durometer plate
- Supporting technical data
- Customer feedback
- What does it mean for you



Source: DigitalCommerce360.com (May 2017)

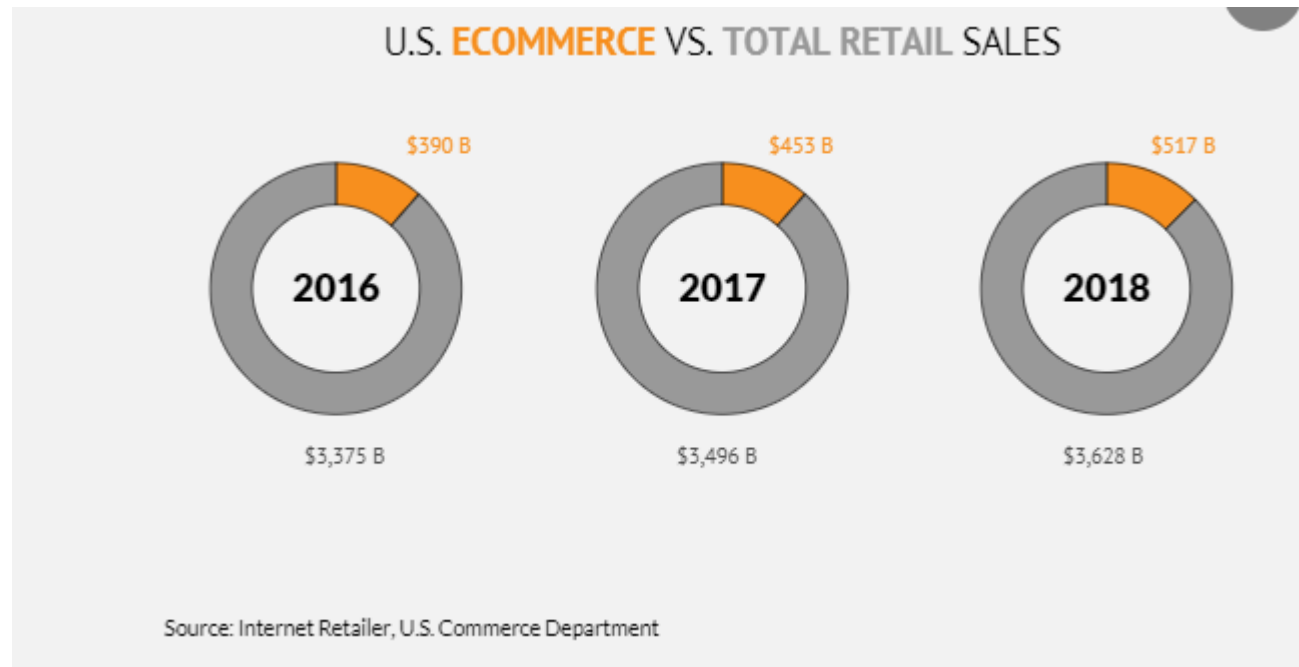
Actuals

- 2017 sales were 177B (30.8% increase from 2017)
- 2018 sales were 233B (30.9% increase from 2018)

E-commerce represented 14.3% of total retail sales in 2018, according to Internet Retailer's analysis. Amazon accounts for 40% of U.S. online retail.

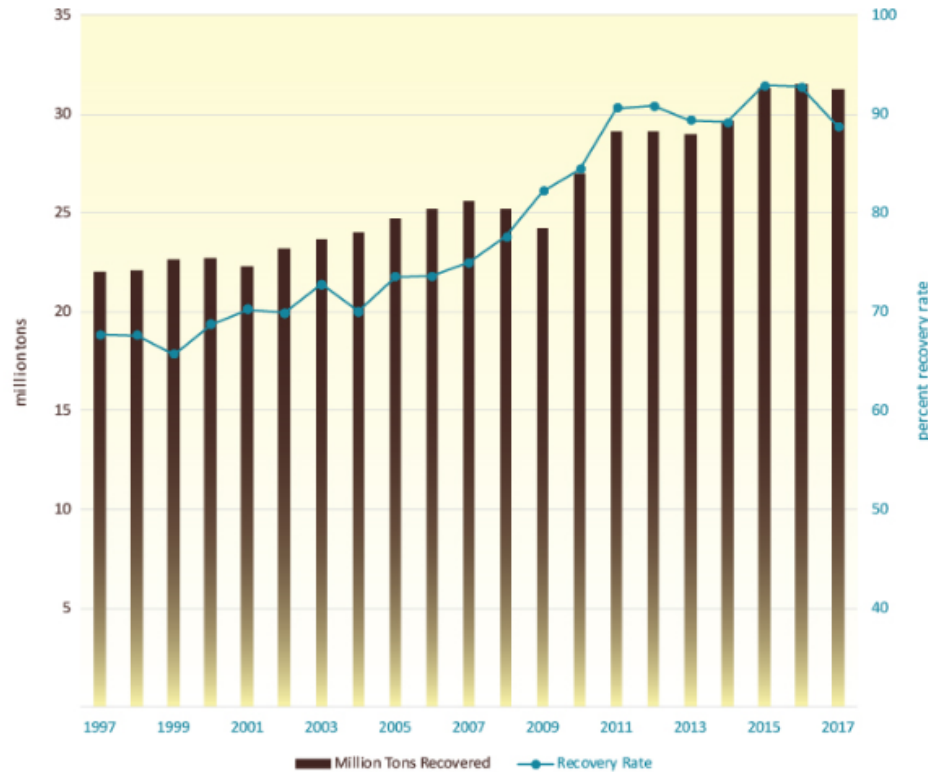
Announced 3/1/19

Gap, JCPenney, Victoria's Secret, Foot Locker: 465 store closures in 48 hours



Growth Rates		
<u>Sales Type</u>	<u>2017 vs 2016</u>	<u>2018 vs 2017</u>
E-Commerce	16.2%	14.3%
Total Retail	3.6%	3.8%

- Increased use of recycled board
- Thinner liner paper



Source: American Forest & Paper Association

More than half of recovered fiber used in manufacturing paper and paperboard in the U.S. goes into making containerboard.

Source: American Forest & Paper Association

Made from up to 85% recycled materials, corrugated packaging material is a great example of the circular economy.

Source: MarketWatch – Corrugated Packaging Market Research Report 2018

In 1991, when the industry made the move to include edge crush tests as an alternative measure for shipping containers, more than 50 percent of all linerboard production was 42# linerboard. Then, most of the production was virgin kraft pulp. Now, 42# linerboard, both recycled and kraft combines, represent less than 20 percent of all linerboard production. The whole scale of linerboard production has shifted down (see chart). Now 15.1 percent, or about 3 million tons, of linerboard are 32# or below.

Domestic Linerboard	% of Total in 2000	% of Total in 2017
26 & Under	3.4	5.3
27 - 32#	1.9	9.8
34 - 41#	23.8	33.9
42#	28.4	16.7

Source: American Forest & Paper Association

Lightweighting has been particularly successful in Western Europe, where box weights are now typically about 80% of US weights

Source: Smithers Pira 2018 Report - The Future of Corrugated Packaging to 2023



- Procurement!!
- Consumers possibly

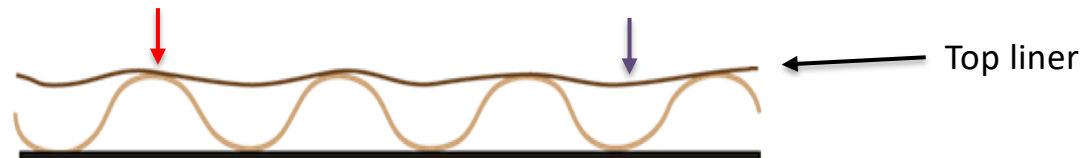
- Printers!!

Why Not??

- The recycled content is less uniform and varies between batches
- Particulates due to recycling can prevent the ink from penetrating the board uniformly
- Recycled fibers are shorter in length reducing the liner strength
- Recycled board tends to be dustier

As identified by customers/printers:

- As the top liner (printed surface) gets thinner, it conforms into the flute valleys
- More impression is needed to print the solid image in the valley area 
- More impression with a harder plate could cause the corrugated medium to compress more, possibly jeopardizing the box strength integrity 



1. Better ink laydown
2. Impression latitude
 - No board crush
3. Something new for the tradeshops to sell to their customers

Ink Coverage Benefits

Result: Better than standard durometer plate

- Solid ink density, dot gain, fine reverses and text

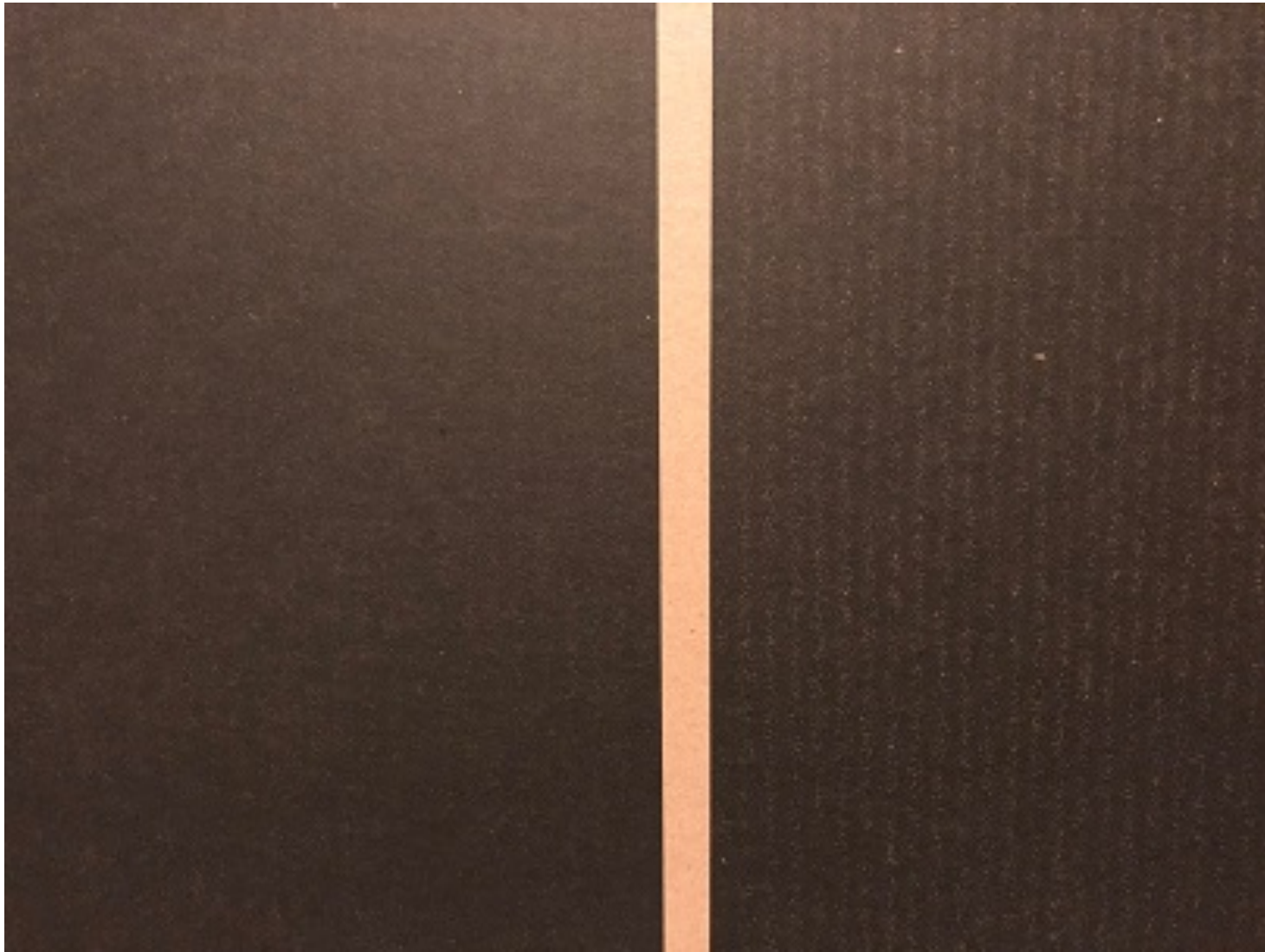
Press	Bobst 160 - Clemson		
Speed	3000 boards per hour		
Anilox Rolls	360lpi /5.0bcm; 300lpi/8.0bcm		
Ink	Water-based cyan		
pH	9.7		
Ink System	Chambered doctor blade		
Viscosity	24 sec on Din 4		
Board	C-flute kraft 26ECT		
	C-flute kraft 32ECT		
Mounting:			
.155"	.030 PVC with 5mil 2205 adhesive		



Standard

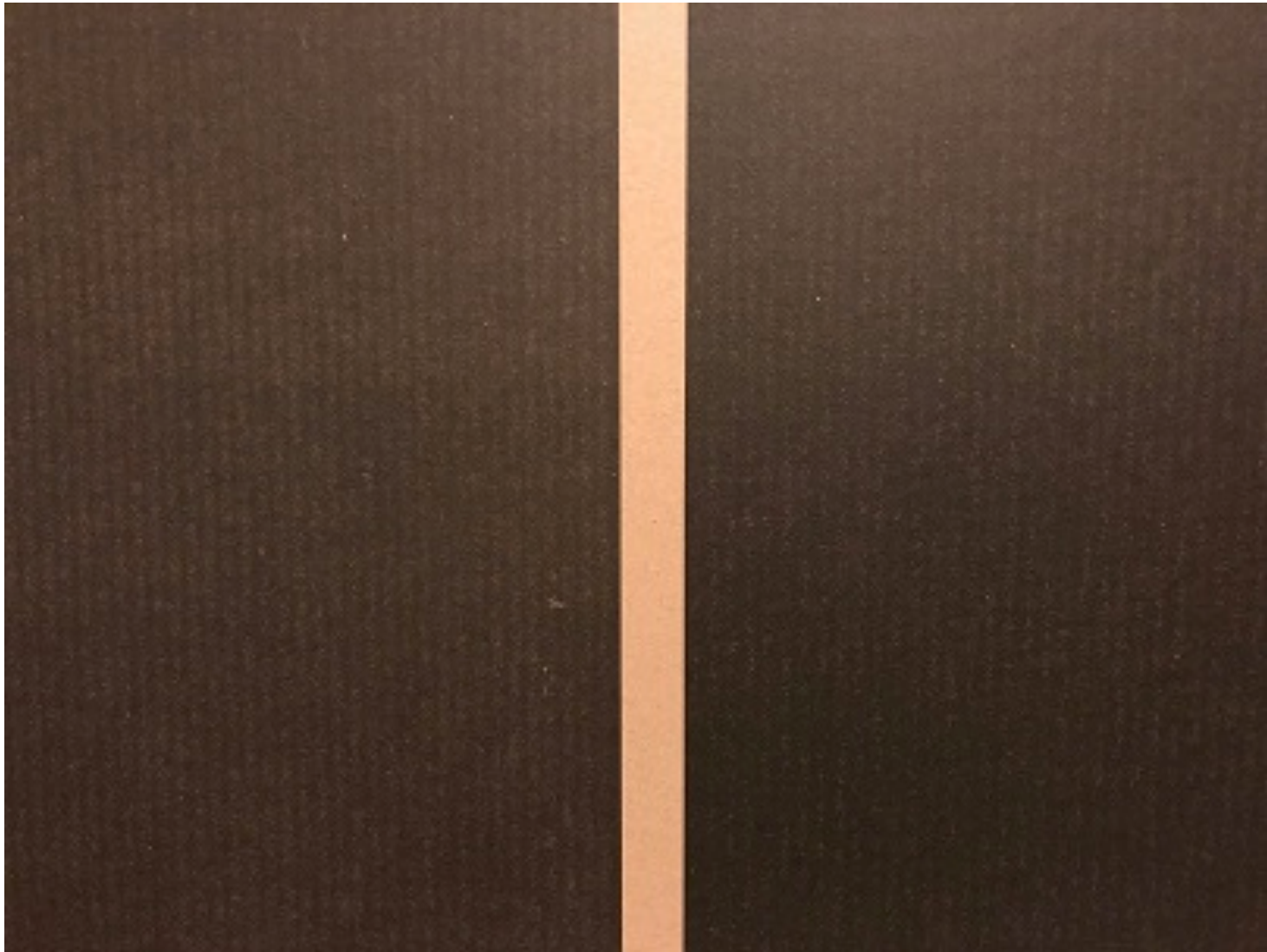


DLC



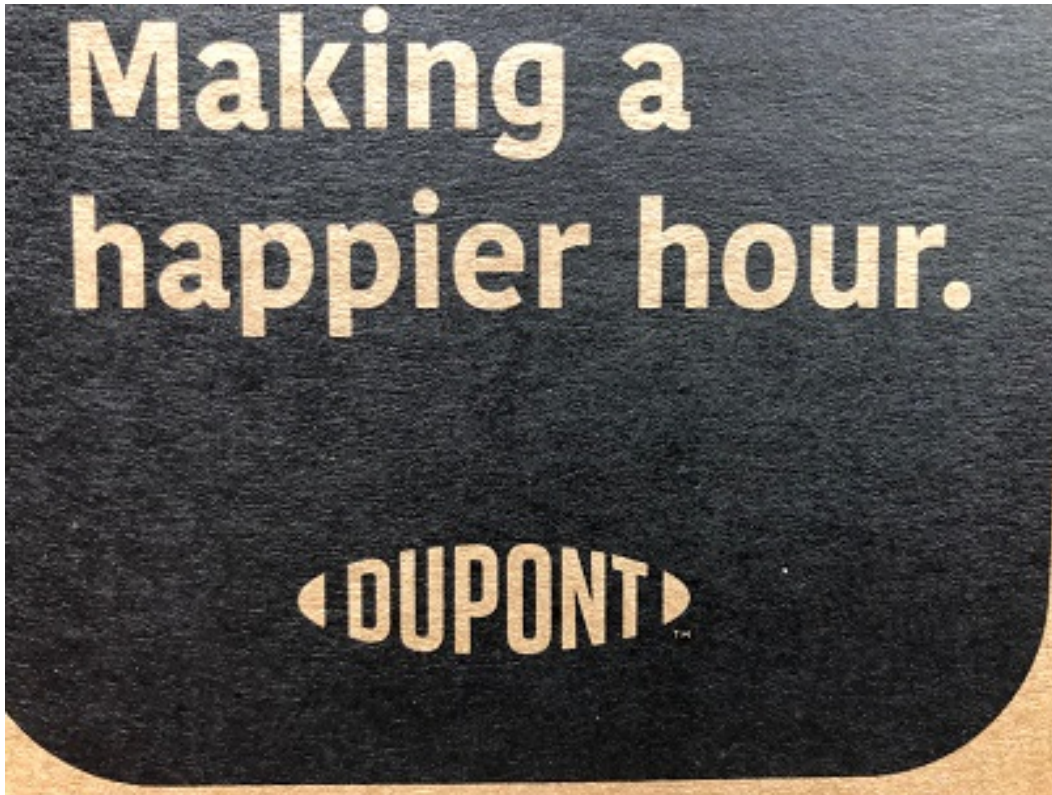
DLC – 300 / 8.0 BCM

DPC – 300 / 8.0 BCM



DLC – 360 / 5.0 BCM

DPC – 300 / 8.0BCM



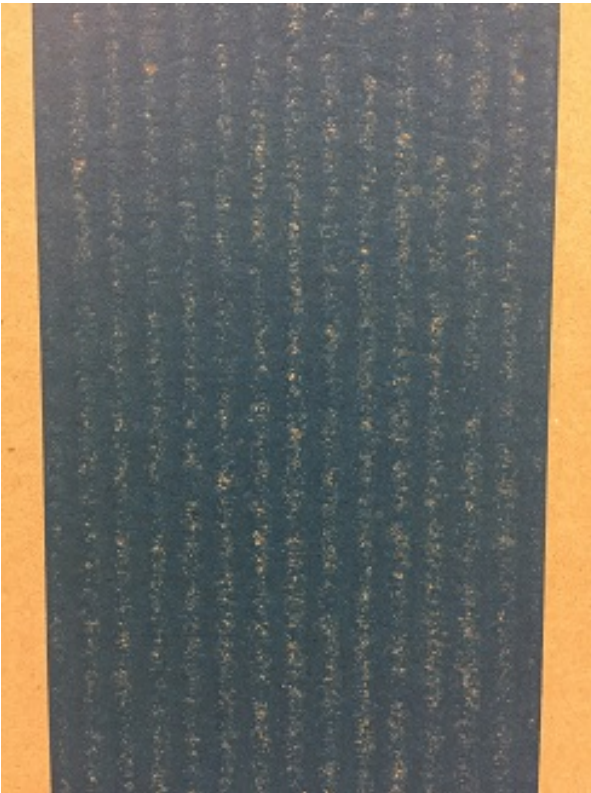
DLC – 300 / 8.0 BCM



Result: Better than Competitor D liquid plate

- Solid ink density, dot gain, fine reverses and text

	Workhorse International							
Speed	50 sheets per minute							
Anilox Roll	360lpi / 5.0bcm							
Ink	Water-based cyan							
pH	9.7							
Ink System	Chambered doctor blade							
Viscosity	21 sec on Din 4							
Board	C-flute kraft 32ECT							
Mounting:								
155	Adhesio Gray Foam on Pebbled PVC PLUS 0.125- 60 (.030 PVC with 0.095 foam) with 5mil 2205 adhesive							
250	.030 PVC with 5mil 2205 adhesive							
Plates								
	155 DLC							
	155 DPC							
	155 Liquid							
	250 DLC							
	250 DPC							
	250 Liquid							



.155" Liquid



.155" DPC



.155" DLC



.250" Liquid



.250" DPC

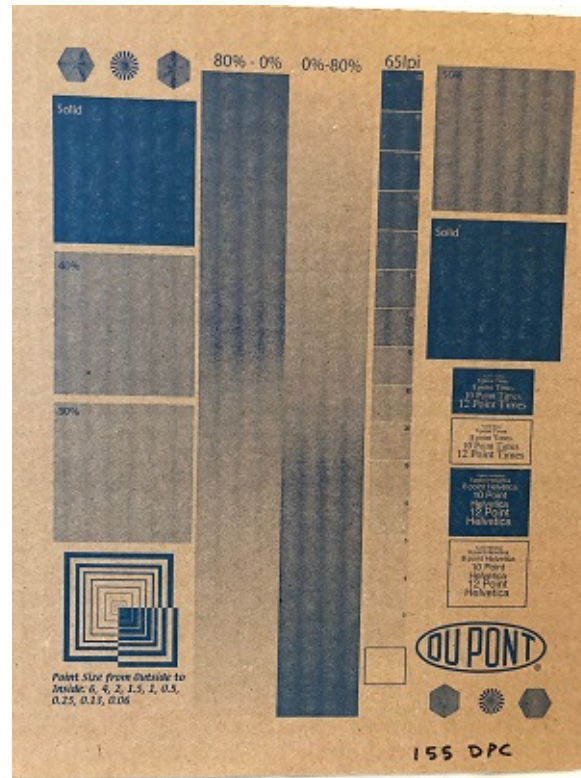


.250" DLC

Key Takeaway: Improved Printing with DLC



.155" Liquid



.155" DPC



.155" DLC

Key Takeaway: Improved Printing with DLC



.250" Liquid



.250" DPC



.250" DLC

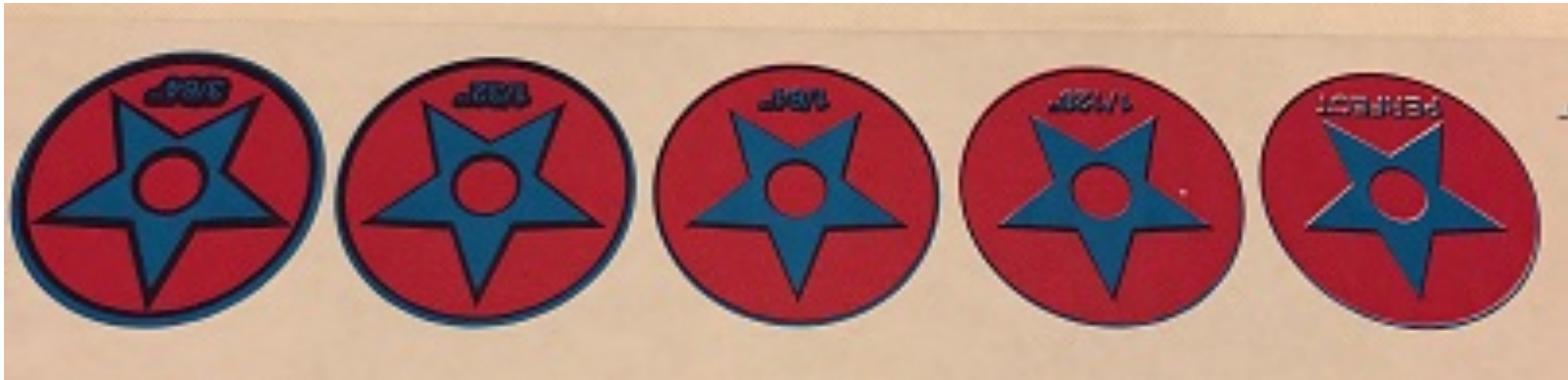
Registration Test



Trail Edge



Lead Edge



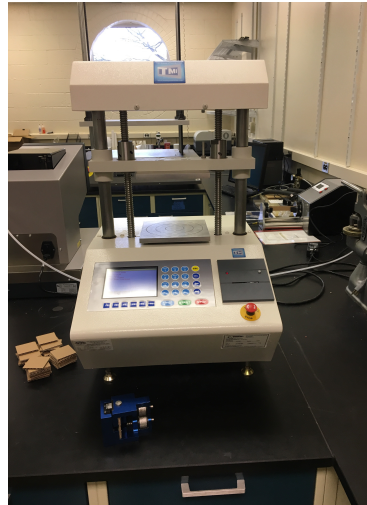
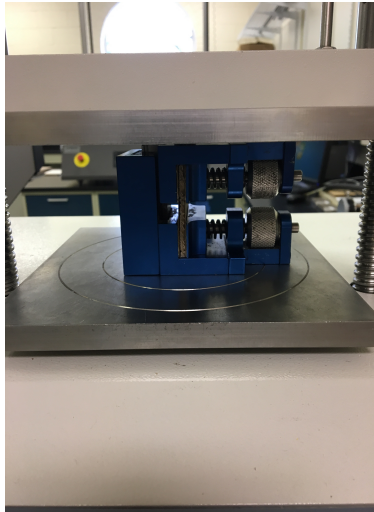
Opposite Trail Edge



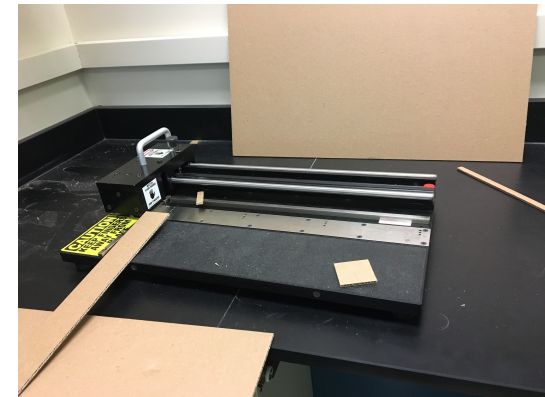
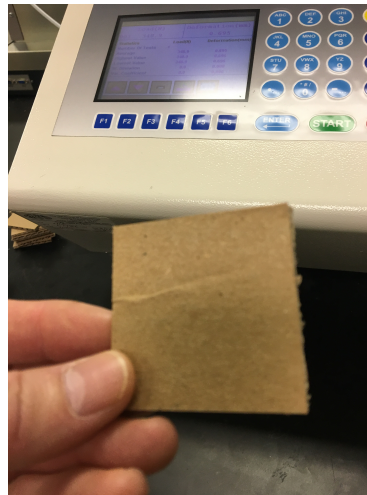
Lead Edge



Edge Crush Testing



The hypothesis is that a harder plate will make the defined print sample fail quicker than a softer plate, thus reducing the strength of the box. A softer plate will allow for greater ink transfer and impression latitude on press.



PECONDITIONING:
23°C, 50% RH
TEST CONDITIONS:
23°C, 50% RH
TESTED ITEM(S):
4 corrugated samples;10 specimens from each sample were tested with an additional 5 specimens of unprinted corrugate
TEST DETAIL:
Edge crush test per TAPPI T839

Printed Samples:

A total of 40 samples were read (10 samples from each of the 4 boards)

Unprinted Samples:

A total of 20 samples were read (5 samples from each of the 4 boards)

Baseline – Unprinted Board (26 ECT C-Flute)

Sample	Optimum Impression Unprinted		Over-Impression Unprinted	
	ECT Value (lb/in)	Std. Deviation	ECT Value (lb/in)	Std. Deviation
1	29.2	0.7	27.0	1.4
2	28.6	0.5	27.1	1.2
3	28.4	0.9	26.9	1.2
4	28.3	1.1	29.4	0.4

Avg.

28.6

27.6



Press Impression Definitions

Optimum – Impression needed to print graphics uniformly across board

Over-Impression - +.010" more impression than Optimum

Unprinted Board Measurement Definition

Measurements of an unprinted area of the boards that went through the press at either Optimum or Over-Impression

Standard
Durometer
Plate

Sample	Optimum Impression		Over-Impression	
	ECT Value (lb/in)	Std. Deviation	ECT Value (lb/in)	Std. Deviation
1	26.6	1.4	24.9	0.7
2	26.8	1.1	24.8	0.8
3	26.6	0.6	23.9	0.7
4	26.4	0.9	23.9	1.1

Avg. 26.6  24.4 (8.3% reduction in ECT value)

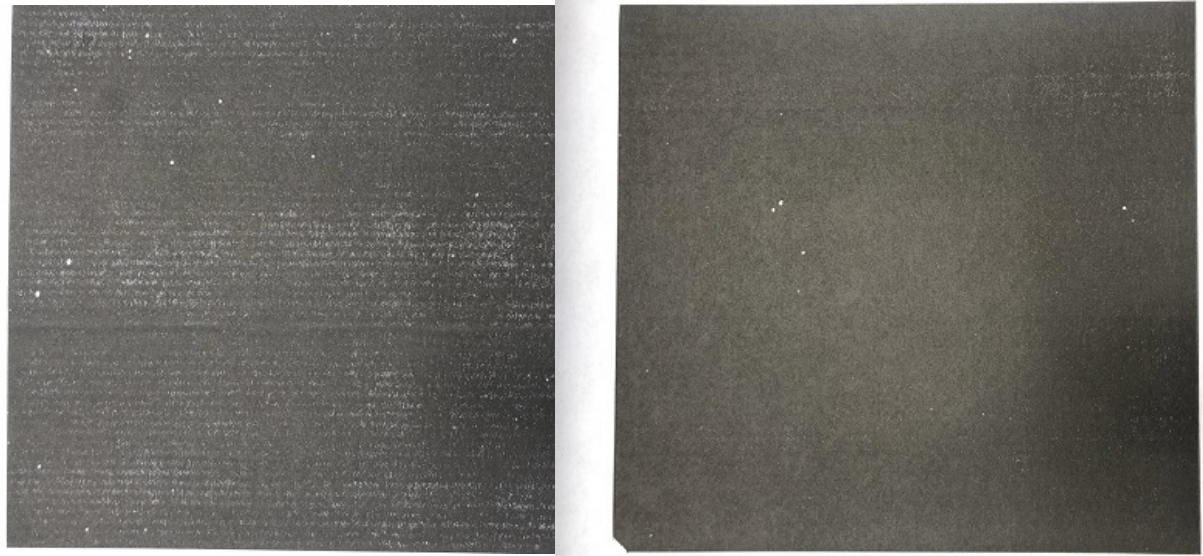
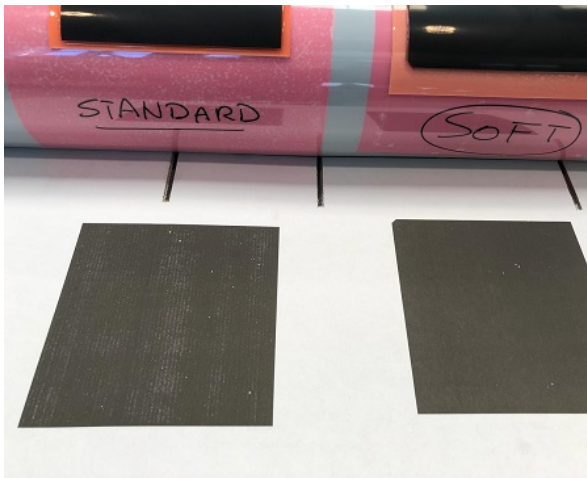
DLC

Sample	Optimum Impression		Over-Impression	
	ECT Value (lb/in)	Std. Deviation	ECT Value (lb/in)	Std. Deviation
1	28.4	0.6	26.3	2.2
2	27.5	0.9	28.2	1.2
3	27.0	1.2	28.6	1.2
4	27.5	1.3	28.3	0.5

Avg. 27.6  27.8

Customer Feedback to DuPont

- Direct comparison – DLC vs. standard durometer **competitive** sheet plate
- Big advantage in solid ink density and coverage



Competitor

DLC

Live designs being printed with DLC 155

Design A

This has now run 72,600 impressions and another 52,000. The plates are performing well with no signs of wear.

Design B

This has now run 145,052 impressions and another 40,000. The plates are clean and showing no signs of distress.

Printer comment

They are performing really well with no signs of shattering like our current soft solid plate when we get operator abuse.

I would be happy to extend testing to more plates, and even switch to the DuPont plate over the existing one supplied

The existing plate is from a **competitor**, a soft durometer plate.

Today I was back on press with the DLC plate, this time we chose another live design that was more complex than the first one we printed and made a set of plates in 155 DLC.

The run started with our existing plate for this design which was Competitor B and they setup and printed around 3000 board feeds (nested 3 up, 9,000 boxes)

We then switched over onto the DLC plates, made some press adjustments then continued the run.

The run was completed using the DLC plate approx. 40,000 board feeds (120,000 boxes) which will all be going to the customer.

The DLC plate will now become the live plate for printing this design and the Competitor B's plate will be put into storage, this job prints nearly every week at around 48,000 feeds.

We now have two live designs running with the DLC plate, the first one replaced a competitive soft plate and the second design from today has replaced another competitive soft plate.

We printed on a brown test liner of low grammage, 100gsm top / 85gsm B flute / 100gsm base (100TL3/B85/100TL3)

The results were very good with no board crush at all and printing @ 350 boxes per minute (high Speed), total 4,400 boxes printed. The press was not stopped once from the minute they pressed the GO button. The plate will now become the live plate for repeat prints.

Great solid coverage, clean positive and reverse text.

Board crush data:

Board Ex corrugator = 2.97 – 2.96

Board Unprinted = 2.95 (unprinted section measured after cut & crease)

Printed area 155 DLC = 2.95 (no crush)



**Blue plate was the only change
(improved ink laydown)**

Yellow – harder durometer plate (DEC)
Red – harder durometer plate (DEC)
Blue - DLC



Yellow – harder durometer plate (DEC)
Red – harder durometer plate (DEC)
Blue - harder durometer plate (DEC)



“X Company has run DLC for 400,000 boards and still going”!

This test was very successful in the X Company DLC test and corporate is recommending that all their plants try it on crush sensitive jobs.

President/Owner

“I have a couple customers hooked. They are running some very soft corrugated board and this has allowed them pretty good results with large solids. They are pounding the impression but still satisfied with the print.”

Graphics Division Manager

They love DLC and specified DLC as the only plate since all their jobs are printed on brown board absorbing substrate.

VP Sales

DuPont's Offering



Corrugated Durometer Comparisons

Shore A

<u>Thickness</u>	<u>DLC</u>	<u>DPC</u>
.250"	26	34
.155"	29	37
.125"	31	39

DLC GMC's

<u>Material</u>	<u>Material description</u>
D15542676	CYU DLC 112 1067X1524 42X60 7P
D15542677	CYU DLC 112 1270X2032 50X80 7P
D15538916	CYU DLC 125 1067X1524 42X60 7P
D15538917	CYU DLC 125 1067X1524 50x65 7P
D15538919	CYU DLC 125 1270X2032 50X80 7P
D15538921	CYU DLC 155 1067X1524 42X60 6P
D15538922	CYU DLC 155 1270X2032 50x65 6P
D15538923	CYU DLC 155 1270X2032 50X80 6P
D15543128	CYU DLC 170 1270X2032 42x60 6P
D15540735	CYU DLC 170 1270X2032 50X80 6P
D15540524	CYU DLC 185 1270X2032 42x60 6P
D15538924	CYU DLC 185 1270X2032 50X80 6P
D15538925	CYU DLC 197 1067X1524 42X60 5P
D15539585	CYU DLC 197 1067X1524 50x65 5P
D15539584	CYU DLC 197 1067X1524 50x80 5P
D15539583	CYU DLC 217 1067X1524 42X60 5P
D15539582	CYU DLC 217 1067X1524 50x65 5P
D15539581	CYU DLC 217 1270X2032 50X80 5P
D15539580	CYU DLC 237 1270X2032 42x60 4P
D15539578	CYU DLC 237 1270X2032 50X65 4P
D15539579	CYU DLC 237 1270X2032 50X80 4P
D15538926	CYU DLC 250 1067X1524 42X60 4P
D15538928	CYU DLC 250 1270X2032 50X65 4P
D15538929	CYU DLC 250 1270X2032 50X80 4P

- For .125" (3.18mm) thickness – 3% min dot at 85 lpi (34L/cm) maximum
- For .155" (3.94mm) and above - 3% min dot at 71 lpi (28 L/cm) maximum
- DLC can be used with DigiCorr for low line screen 1-2 color work.
 - We recommend DPC/DigiCorr for all higher-end graphics
 - Recommend fingerprinting DLC as dot gain may be different than DPC

- What all sales people want – “Something new to sell”
- Sales reps can promote these key benefits to your customers
 - Improved solid ink coverage
 - Improved impression latitude
 - No edge crush using DLC
 - The ability to mix plate types without registration issues
 - Get the best of both worlds
 - Potential ink cost savings for your customers

- DuPont continues to invest in Cyrel® plates for the corrugated flexo printing segment
- DLC has demonstrated superior print performance in both internal DuPont and customer external testing and usage...and very favorable over the competitive soft durometer plates.
- Customer feedback supports this claim – the ultimate compliment!

Questions?

Thank You!

Make
corrugated
your canvas

Introducing Cyrel® DLC Plates for corrugated printing. Cyrel® DLC plates provide incredible ink transfer for complete coverage on even the most challenging down-gauge corrugated boards—with incredibly soft plates designed to protect both the integrity of your work, and the product inside.

DuPont™ Cyrel® DLC
Learn more at Cyrel.DuPont.com/DLC

DUPONT

 **CELEBRATING**
45 Years
DuPont™ Cyrel®