
The Changing Face of Corrugated Printing

Adapting to Change in
Shifting Markets

Rely on us.



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State of the Industry

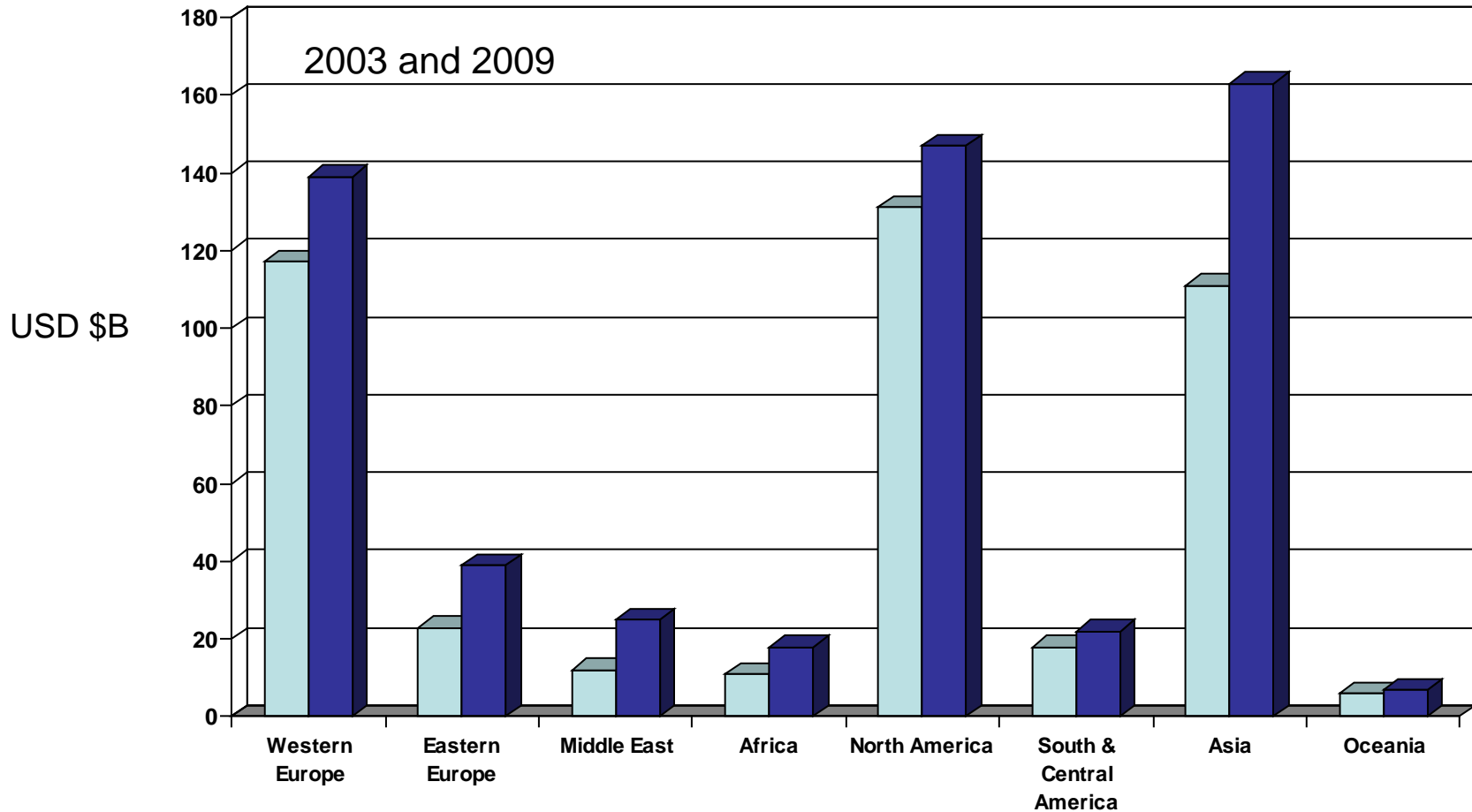
- ▶ **Today, the US is the largest global consumer country of packaging**
- ▶ **China is expected to surpass the US by 2017**
 - ◆ China to become largest consumer of corrugated this year (Freedonia)
- ▶ **India will enter the Top 10, with demand doubling in the next 5 years**
- ▶ **Estimated Overall Growth Rate of 3% in the US**
- ▶ **Total Global Market CAGR of 4+% (PIRA); 5.7% (RISI)**
 - ◆ US and Western European markets saturated
 - ◆ Consumption shifts to emerging markets
 - China, India, South America



PIRA International Study – Packaging World Magazine January 2012

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World Packaging Consumption by Region



Source: World Packaging Organization, Market Trends, 2009



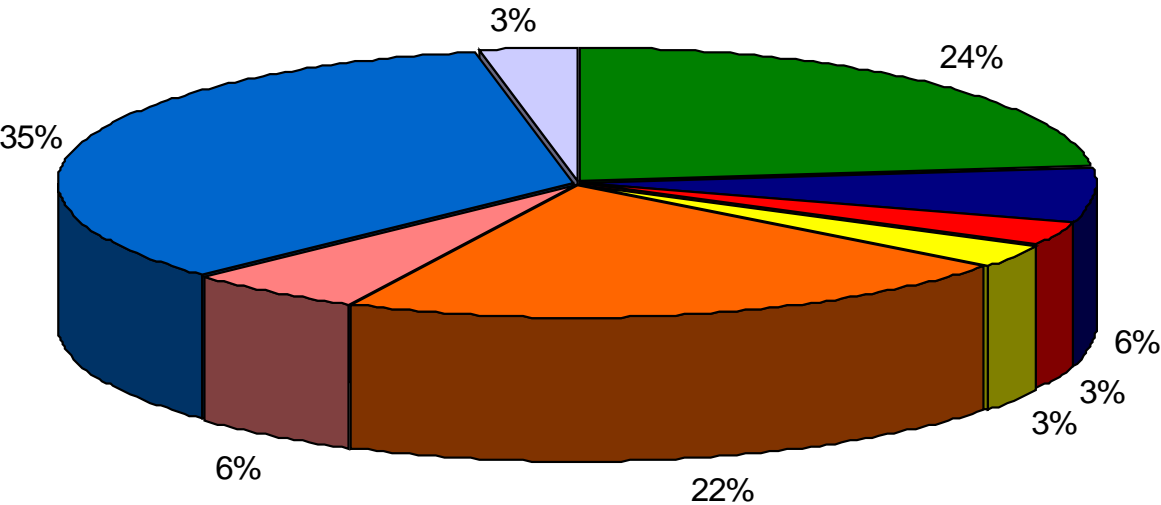
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The Rationale for the Shift

- ▶ **Population of China – 1.34 Billion (19.2%)**
- ▶ **Population of India - 1.21 Billion (17.1%)**
- ▶ **Population of the United States - 0.315 Billion**
- ▶ **Average Income Differences**
- ▶ **Burgeoning Class of Consumers**



Global Packaging Market by Region – 2016 estimate

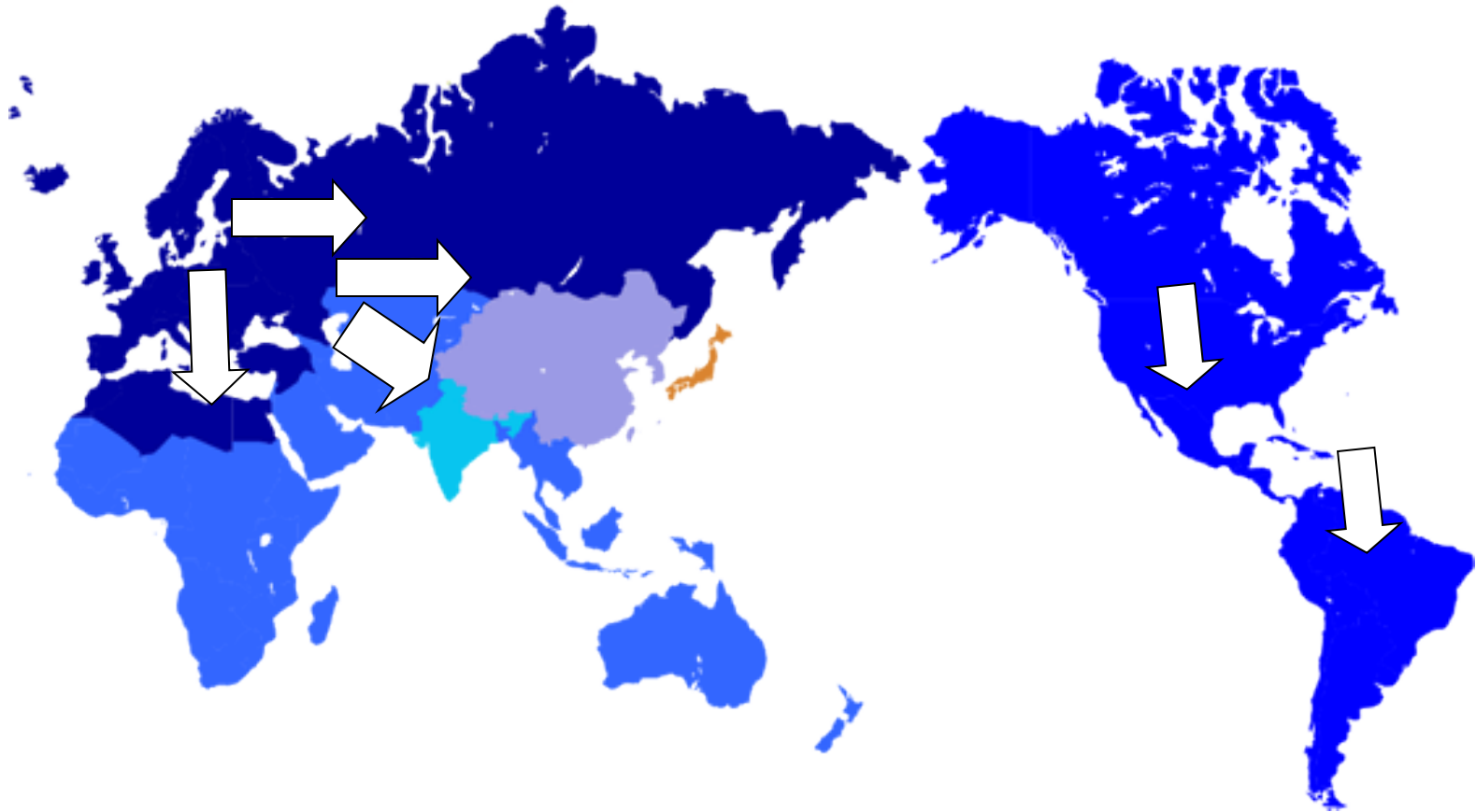


- Western Europe
 CAGR 2011-2016 ~1%
- Eastern Europe
 CAGR 2011-2016 ~4%
- Middle East
 CAGR 2011-2016 ~4%
- Africa
 CAGR 2011-2016 ~5%
- North America
 CAGR 2011-2016 ~1%
- South / Central America
 CAGR 2011-2016 ~5%
- Asia
 CAGR 2011-2016 ~6%
- Australasia
 CAGR 2011-2016 ~1%

Source: PIRA International Ltd. - 2012



Shifting Manufacturing



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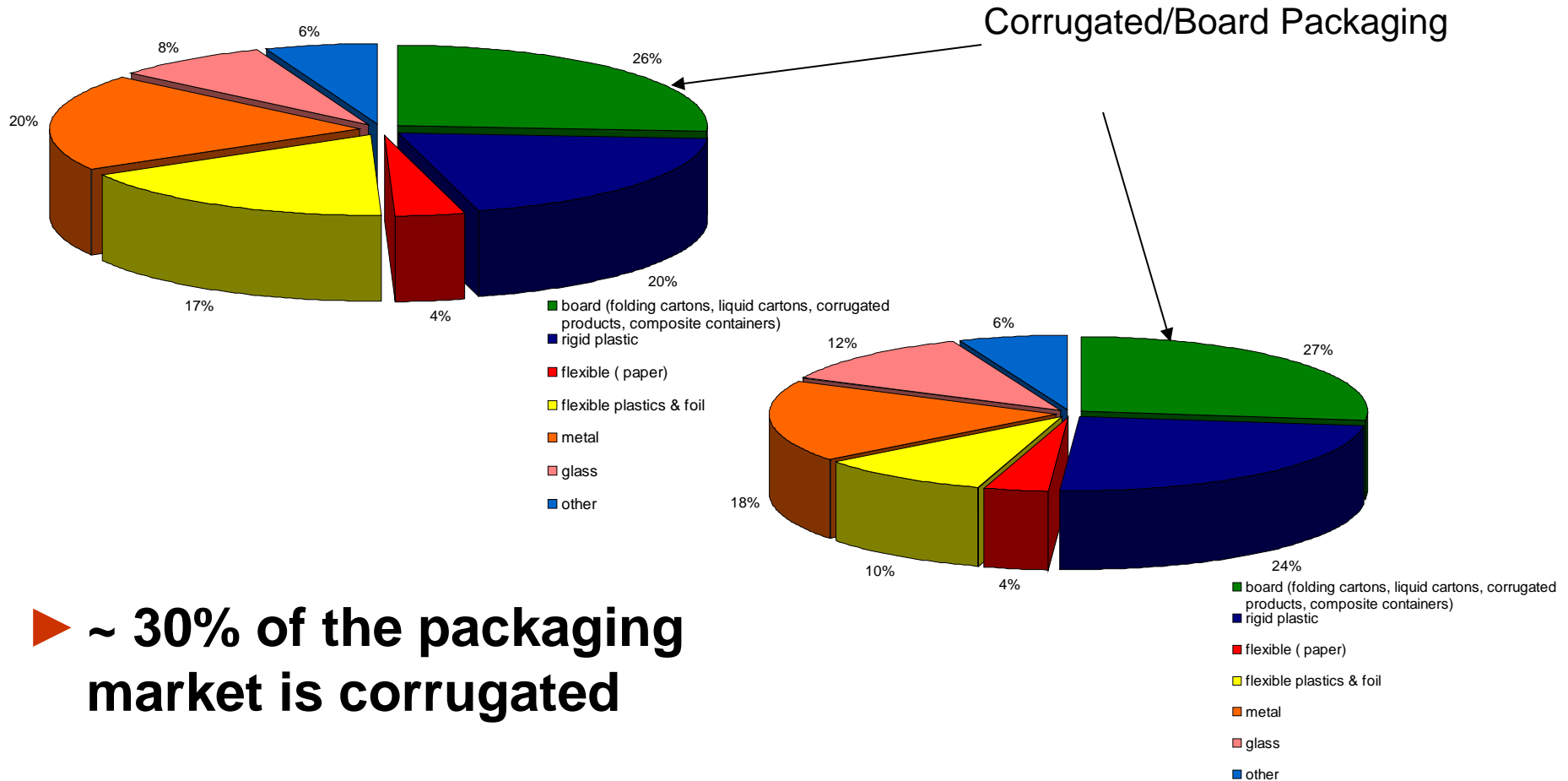
The Markets of Europe and The United States

A Flint Group Perspective



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Western and Eastern Europe Breakout



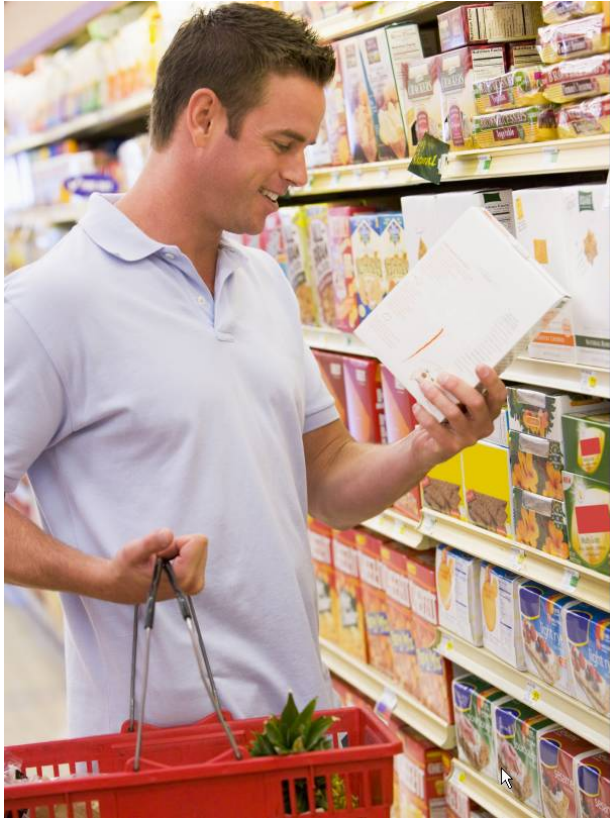
▶ ~ 30% of the packaging market is corrugated



Source: PIRA International Ltd. - 2012

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Consumers Buying Preferences



- ▶ **Buying what you know best (Brand)**
- ▶ **Buying what appeals to you (Packaging)**
- ▶ **Buying the least expensive (Price)**



Corrugated Packaging Market - Trends

- ▶ **More focus on brand and cost effective packaging**
- ▶ **Sustainable - made of reclaimed/recycled and high fiber content material**
- ▶ **Conversion from analog to digital plate making**
 - ◆ Estimate that Eastern and Central Europe 95% Digital
 - ◆ Southern Europe, Italy and Spain, cost driven
- ▶ **Two sectors: Transit (Shipping) and Retail (Marketing)**



Corrugated Packaging Market - Trends

- ▶ **Higher print quality demands**
- ▶ **More point of sale advertising - increased use of multi- color halftone printing**
- ▶ **Increased productivity and efficiency requirements**
- ▶ **Move of production from western to eastern countries**
 - ◆ Primarily for cost reductions and shift of markets



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Two sectors – Different Drivers

▶ The Box as a Shipping Container

- ◆ Commodity Products
- ◆ Raw Material Costs



▶ The Box as a Marketing Tool

- ◆ Added value through packaging – perception of quality and innovation
- ◆ Branding & Marketing
- ◆ High quality, multi-color designs
- ◆ Retail Ready Packaging



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Transit Packaging – Plate Trends

- ▶ **Liquid photopolymer losing share to sheet**
 - ◆ Conversion from analog to digital plate processing
- ▶ **Needs for plates with lower hardness to achieve area coverage**
- ▶ **Over all cost pressure**



Transit Packaging – Low Cost Packaging

- ▶ **Strictly price oriented**
- ▶ **Simple text and line work, one and two color**
- ▶ **Low line screen ruling**
- ▶ **Only ink transfer required**



Retail Packaging – Quality Printing

- Almost all digital printing plates
- Higher pigmented inks
- Higher screen rulings
- Increased number of colors



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Retail Packaging –Trends

- ▶ **Tendency to harder plates – high print quality with medium hardness plates**
- ▶ **Mix of plate thicknesses due to regional differences, trend to thickness 3.94mm and thinner (0.155”, 0.112” and thinner)**
- ▶ **Conversion to preprint – increased number of press installations**
- ▶ **Increased requests for bigger sizes**
- ▶ **Entry of Flat Top Dot technologies in the last two years**



Business Drivers – Retail Packaging

▶ **Demographics**

- ◆ Changed advertising and consumer behavior

▶ **Growth in the emerging markets**

- ◆ New consumers

▶ **Brand owner's demands on quality**

▶ **Shorter product lifecycles, new brands**

▶ **Sustainability – new regulations**

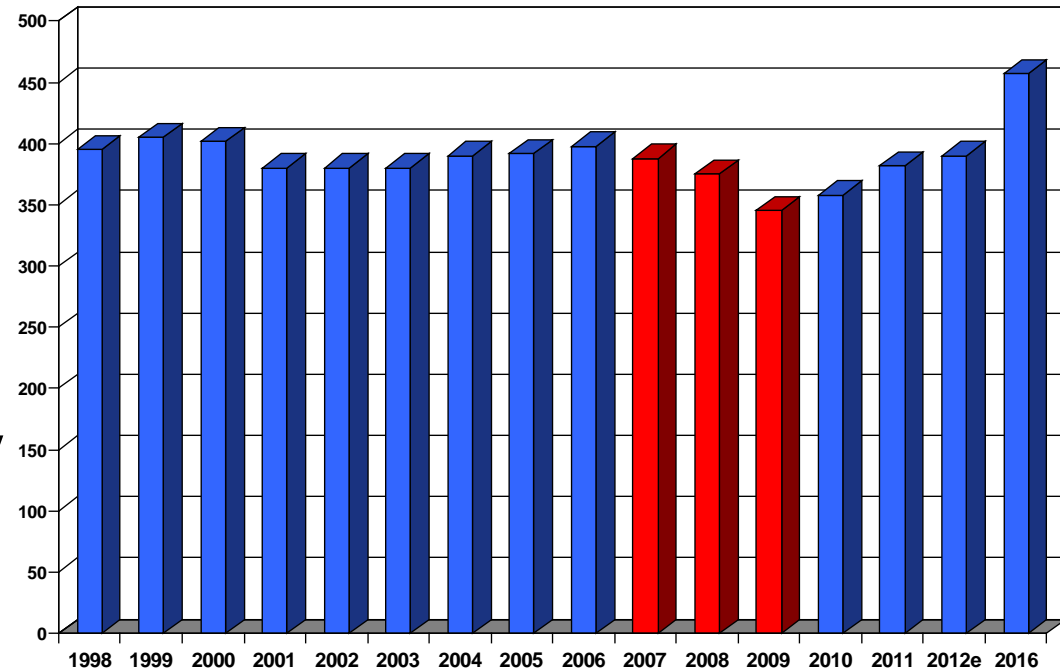


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US Corrugated Box Market

- ▶ **Finally getting back to pre 2008 levels after > 12% Decline 2007 - 2009**
- ▶ **Optimistic Growth Rate of 3 - 4% through 2016 (Pira), 5.7% (RISI)**
- ▶ **Continued market consolidation and capacity reductions**
- ▶ **Growth from Food and Beverage Markets**

Corrugated Box Shipments 1998 to 2016 est.
BSF



Sources: RISI 2012
PIRA 2012



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Packaging Strategies

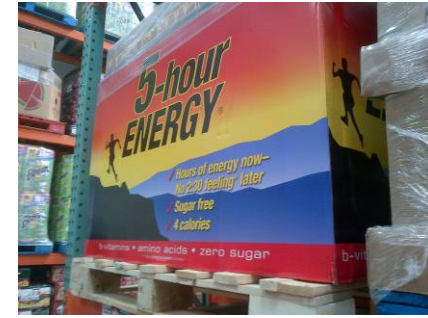
▶ Big Box Stores

- ◆ RRP
- ◆ POP

▶ The shipping container as the display

▶ What's next?

- ◆ Food vs other products
- ◆ Display stores
- ◆ Amazon Model
- ◆ Best Buy strategy



The Challenges



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Consolidation and Centralization

▶ Acquisitions and Consolidation

- ◆ Taking capacity out of the market
- ◆ Closing redundant facilities
- ◆ Bigger integrations
 - IP
 - Rock-Tenn

▶ Large integrated purchaser of printing plates

- ◆ Currently buying from 69 different plate suppliers
- ◆ Wanting to consolidate # of suppliers and negotiate volume related pricing
- ◆ Looking to reduce the total number of suppliers to 8



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The Challenges for the Industry

▶ Other packaging in lieu of corrugated containers

- ◆ P&G – seal-tight plastic in lieu of corrugated containers
- ◆ Wal-Mart – packaging reduction initiatives

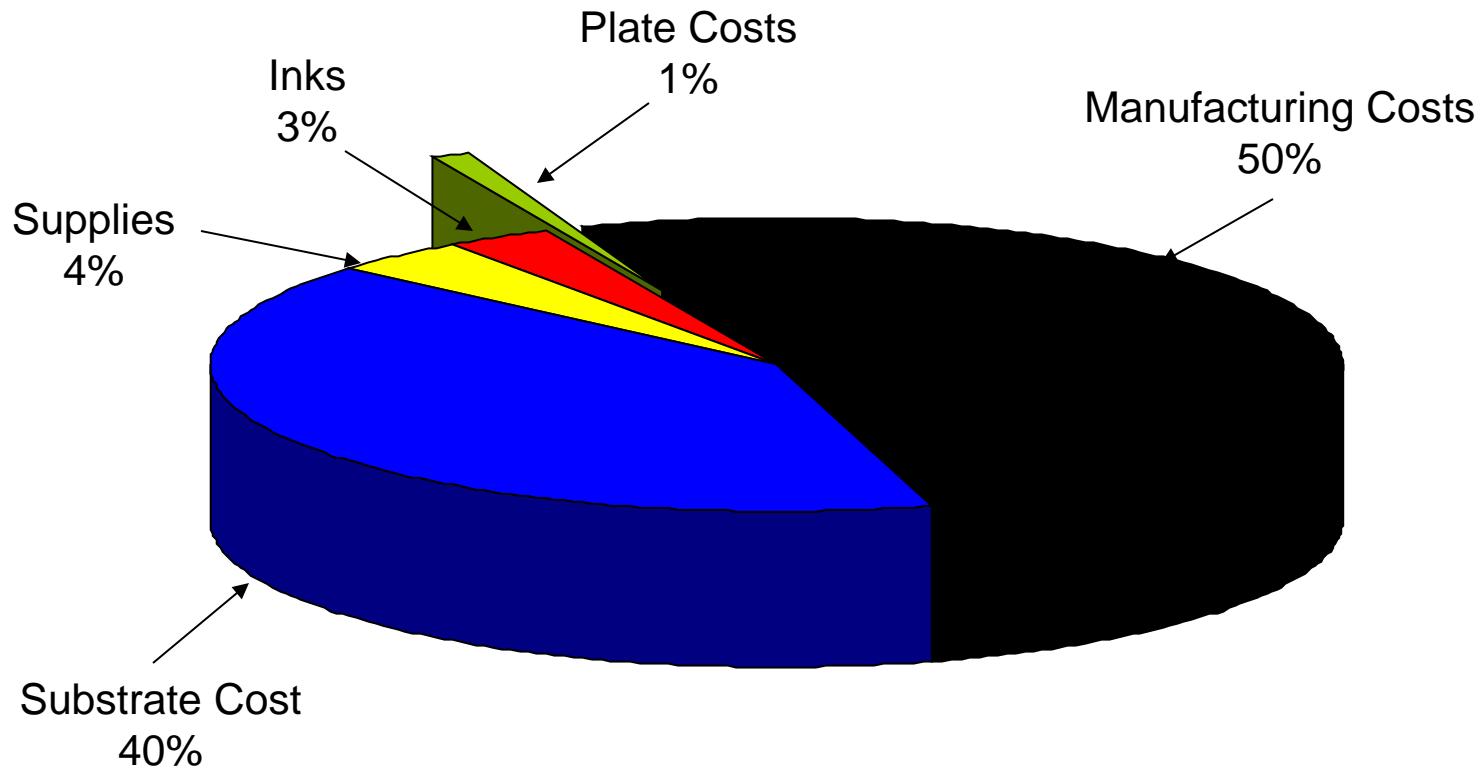
▶ Other printing technologies to improve graphics quality

- ◆ Litho lam
- ◆ Digital
- ◆ Preprint



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Focus on Where the Costs Really Are



Addressing the impact of a down press or substrate waste



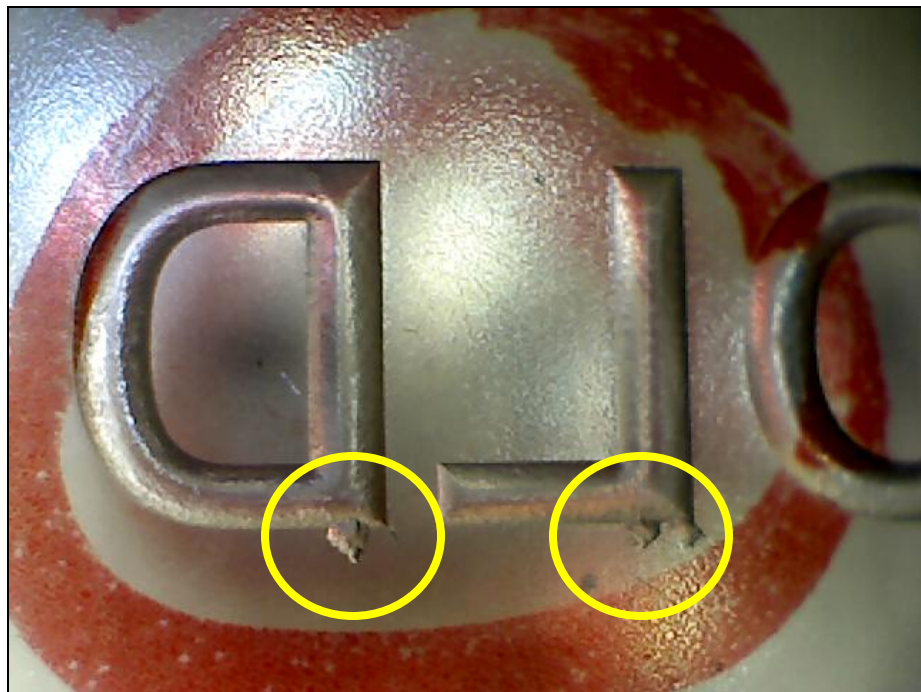
The Challenge for the Plate Supplier

- ▶ **Products that just work**
- ▶ **Consistent quality, consistent imaging**
- ▶ **Static vs. dynamic processing inputs**
- ▶ **Tougher plate products**
- ▶ **Plates that run cleaner and last longer on press**
- ▶ **Products optimized for the process**

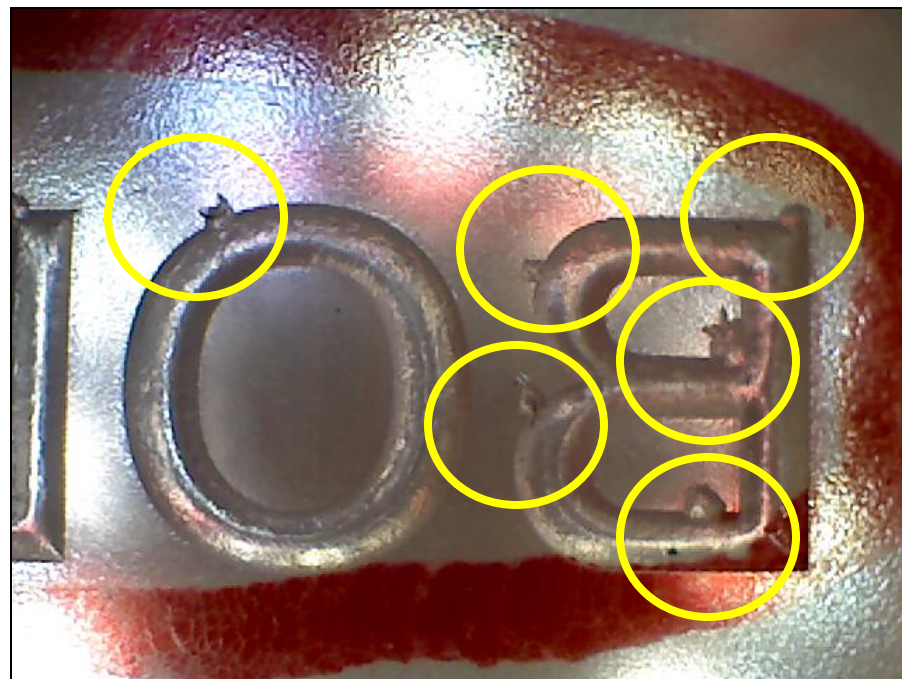


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New Tougher Plate for Corrugated Printing



The Problem



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Influences on Corrugated Plate Chipping

Job

- ◆ Relief depth
- ◆ Design

Processor

- ◆ Processor Design (Batch vs. Incremental)
- ◆ Washout Time
- ◆ Brush Age and Condition

Washout Solvent

- ◆ Type and Composition
- ◆ Balance
- ◆ Solid Content

Main Exposure

- ◆ UVA Irradiance
- ◆ Main Exposure Time
- ◆ Vacuum Kreen

Plate Type

- ◆ Polymer Composition
- ◆ Conventional vs. Digital?



Testing

Optimization of Plate Processing Parameters

Description:

- ▶ **0.250” plates were made with different plate parameters (BE,FE, washout, etc.) using regular 0.120” relief and also deep > 0.180” relief**

Key Findings:

- ▶ **Regular relief is possible without chipping, but not on a consistent base**
- ▶ **The deeper the relief the more severe the chipping gets**
- ▶ **An increased main exposure time reduces chipping**

Conclusion:

- ▶ **Nothing definitive in the Processing Steps**



Testing

Different Brushes in the Processor

Description:

- ▶ **Some of the brushes were replaced with brushes that had longer bristles. The idea was this could have a positive effect on the chipping**

Key Findings:

- ▶ **The longer brushes had no negative effect on the washout speed.**
- ▶ **The plates were still chipping**

Conclusion:

- ▶ **No luck with this approach!**



Testing

Modified solvent blend

Description:

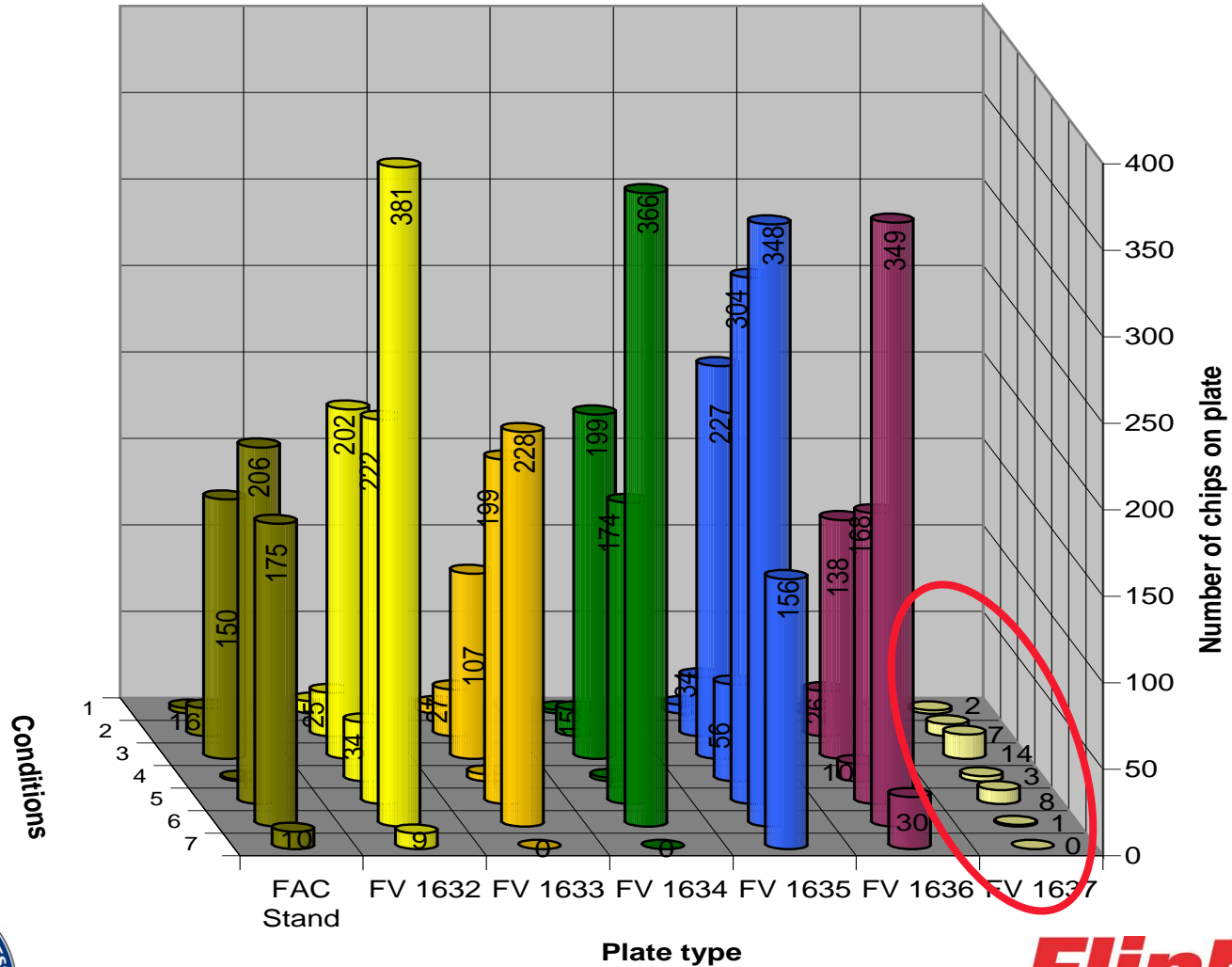
- ▶ **A modified test solvent was blended to make the plate swell less in the processing step**

Key Findings:

- ▶ **First results looked promising but chipping could not be completely eliminated.**



Modified Formulation of the Plate



Conclusions

- ▶ **Some of the approaches had a level of success but could not ensure elimination of chipping**
- ▶ **Adjustments to plate making parameters will reduce (or solve) the chipping**
- ▶ **Modified formulation shows significant promise**
- ▶ **In testing at a few customers**



nyloflex[®] **NEW** ACE



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Why Change A Good Thing?

- ▶ We believed we could do better
- ▶ Needed better relief control (back exposure)
- ▶ Improve overall image quality
- ▶ Improve color stability of the plate



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The NEW nyloflex® ACE – Physical Properties

▶ Basically the same

- ◆ 62 Shore A (DIN 53505), same as previous nyloflex® ACE
- ◆ Designed for solvent, water and UV curable flexographic inks

▶ Improved overall image quality and color stability, with a brighter green color



Similar Physical Properties to ACE

- ▶ No change in digital black mask layer
- ▶ Improved exposure latitude
- ▶ Improved solvent resistance
- ▶ Comparable dot gain curve to Original ACE



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The NEW nyloflex® ACE – Customer Feedback

“We printed **1,000,000 ft** of pet food bags **without cleaning** (normally we stop to clean after 500,000 ft); We were able to run the job **175 fpm faster and saved 7.5 hours** in press time!”

“As a leading printer of confectionary bars we ran **1,500,000 ft and no cleaning** of the plates was needed.”

“...label printing job with the NEW nyloflex® ACE Digital ran **200,000 ft, no stops** for cleaning were necessary.”

“A difficult hygiene packaging job **650,000 ft** could be printed **without stopping** for cleaning - **consistent print quality** over the whole production run.”

“We ran **70,000 lbs of film** substrate on the potato chips job **with only one set** of NEW nyloflex® ACE Digital where previously we needed to replace the plates after 30,000 lbs.”

“**110,000 ft** diapers job showed **excellent ink transfer** and **reduced ink consumption** for achieving target density.”

“High speed flexible packaging job, **1,650,000 ft printed without cleaning.**”



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Examples Fields Savings Calculator

The NEW nyloflex® ACE - Cost Savings Calculator

Please fill in the input in the green fields - customer's data shall be entered

Yellow fields are option fields - please choose the appropriate option

White fields - no input/change possible

Orange fields are result fields

Data	Current Plate in Use	NEW nyloflex® ACE	Results	Notes
No. of Presses	1	1		
No. of Shifts	3	3		
Hours per Shift	8 h	8 h		
No. Working Days / Year	260	260		
Press Downtime	5%	5%		e.g. Maintenance
Currency	US \$			Please choose currency in column C
AVG Press Cost / h	500 / h	500 / h		
AVG Job Size (linear ft / linear m)	linear ft			Please choose unit in column C
	500,000	500,000		Customers reported that the NEW ACE lasted longer than a typical set of plates
No. of colors	8	8		
AVG Press Speed	ft/min			Please choose unit in column C
	800	800		Customers reported that with NEW ACE they were able to run the job faster
Stop to Clean Every... (linear ft / linear m)	250,000	500,000		

NEW ACE_calculator / Summary Page /



Example: Stopping the press 1 Less Time

The NEW nyloflex® ACE - Summary Cost Savings Calculator

Data	Current Plate in Use	NEW nyloflex® ACE	Results
Stop to Clean Every... (linear ft / linear m)	250,000	500,000	
Waste per Year due to Start-up / Change-over (linear m / linear ft)	107,000	107,000	linear ft
Yearly Capacity without Start-up / Change-over Time (linear m / linear ft)	267,424,000	267,424,000	linear ft
No. Cleaning Stops / Job	2.00	1.00	
Cleaning Stop Time / Job	0.80 h	0.40 h	
Time savings due to Fewer Cleaning Stops (h / Job)		-0.400 h	
Cost Savings due to Fewer Cleaning Stops per Job		-200.00	US \$
Costs for Cleaning Stops per Year	214,000	107,000	US \$
Cost Savings due to Fewer Cleaning Stops per Year		-107,000	US \$



UV – LED: No Longer the Future of Flexo Plate Making Technology . . . It's Here!

**Making Products and Technology that
Just Work**



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UV LED Technology

- ▶ **UV LED is used for everything from currency authentication to hardening nail polish**
- ▶ **UV LED Technology has become the de facto imaging technology for many industries using photo-curable products**
- ▶ **Inks, adhesives, coatings . . . and photopolymer plates! nyloflex® NExT**



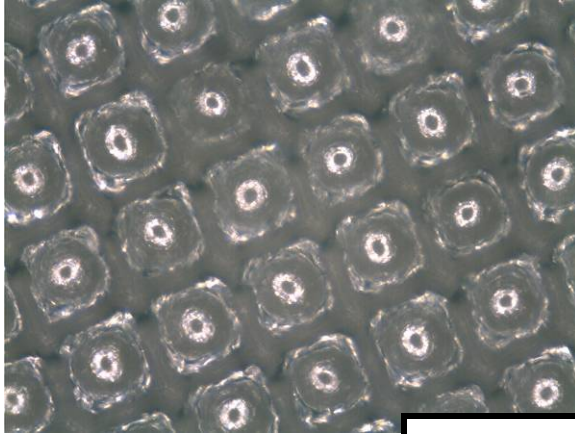
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Benefits of UV LED

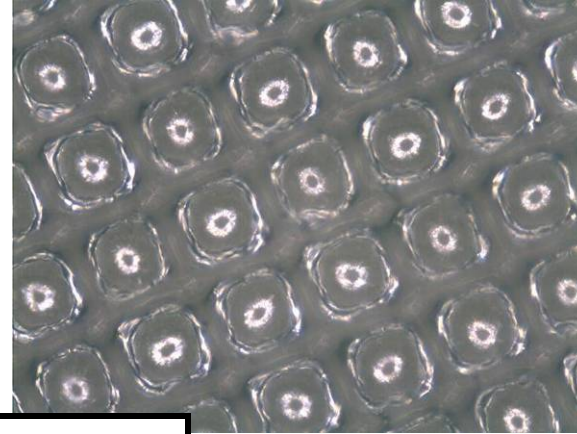
- ▶ **Consistency – targeted wavelength, on or off**
 - ◆ No warm up
 - ◆ No degradation over time
 - ◆ Resistant to vibration and impact
- ▶ **Energy efficient**
 - ◆ Low wattage, low power usage
 - uses 20% of the energy of mercury lamps
 - ◆ Long lasting, > 10,000 hours, newer technology > 50,000 hours
- ▶ **The plate you make today will be the same as the one you make tomorrow, next week, or next month**



Minimum Dot Evaluation

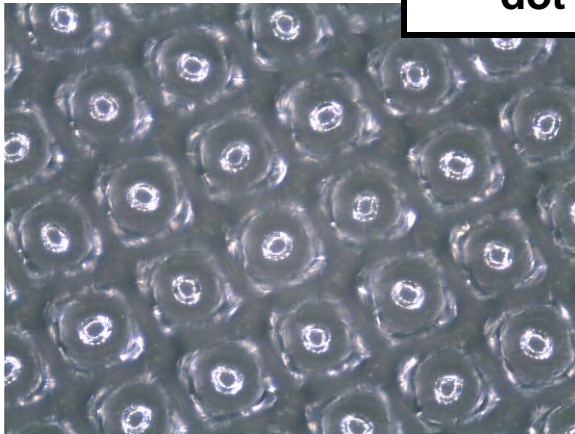


Sep. 20, 2012

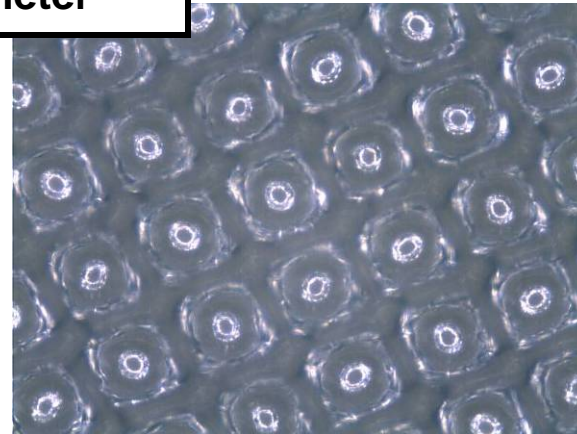


Oct. 11, 2012

**< 0.0001 variation in
dot diameter**



Nov. 1, 2012



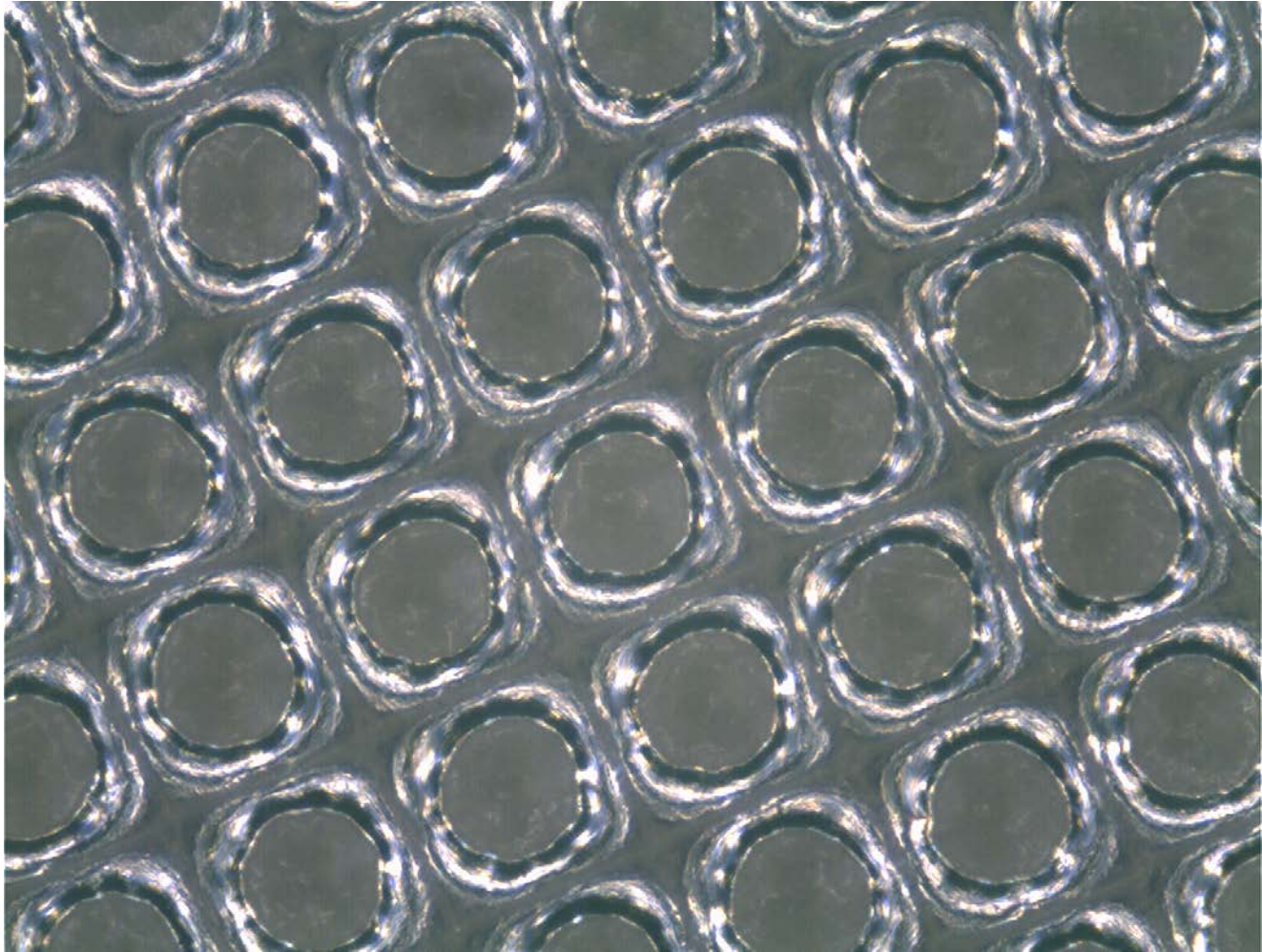
Nov. 15, 2012

4000dpi - 175lpi - 0.4% Circular Dot



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Midtone Dot Evaluation

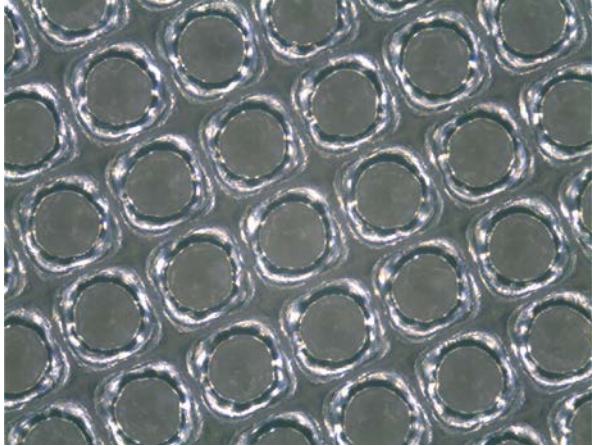


4000dpi - 175lpi - 30% Circular Dot

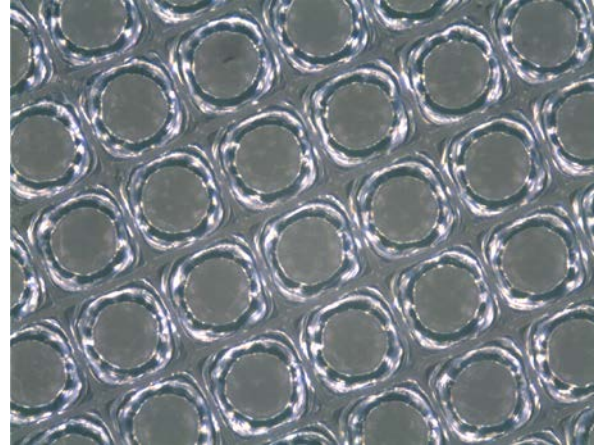


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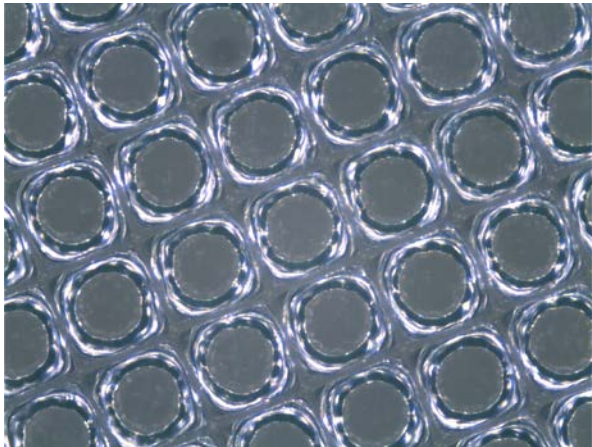
Midtone Dot Evaluation



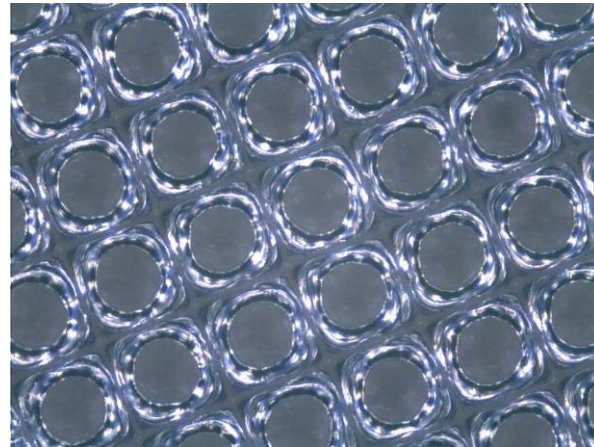
Sep. 20, 2012



Oct. 11, 2012



Nov. 1, 2012



Nov. 15, 2012

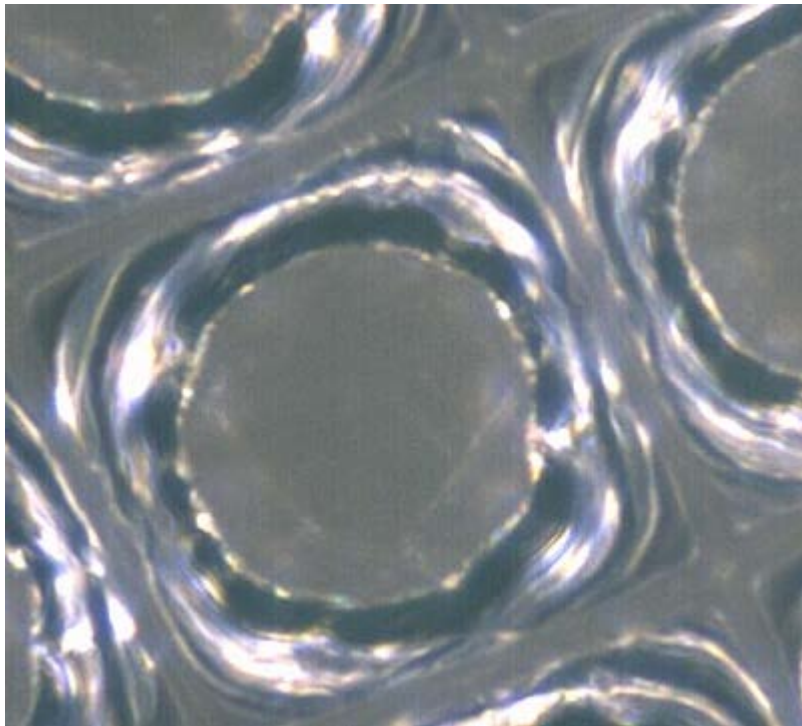


4000dpi - 175lpi - 30% Circular Dot

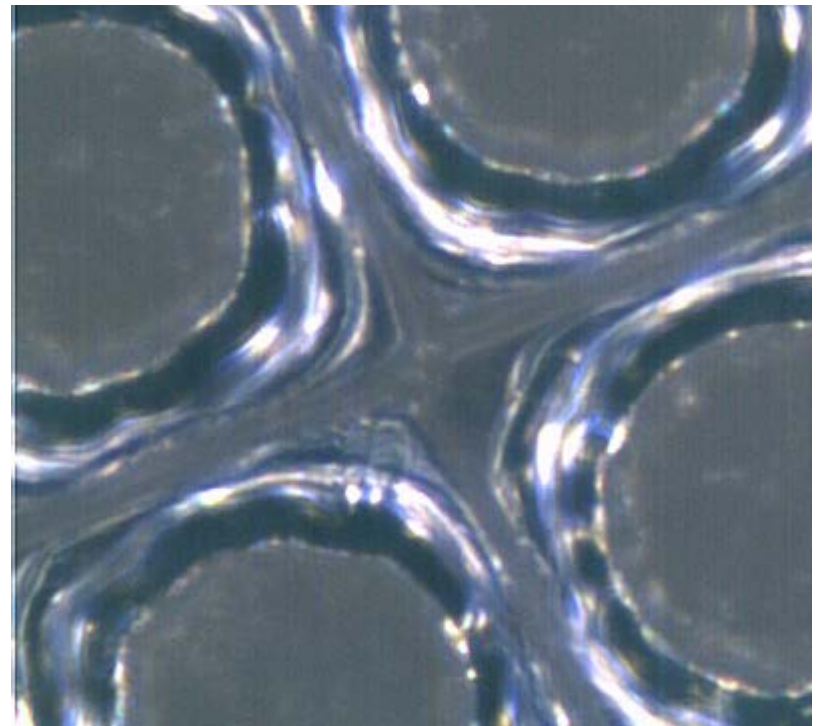
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Midtone Dot Evaluation

- ▶ Consistent dot shape and size
- ▶ Clean reverses between dots



Oct. 11, 2012



Nov. 1, 2012

4000dpi - 175lpi - 30% Circular Dot

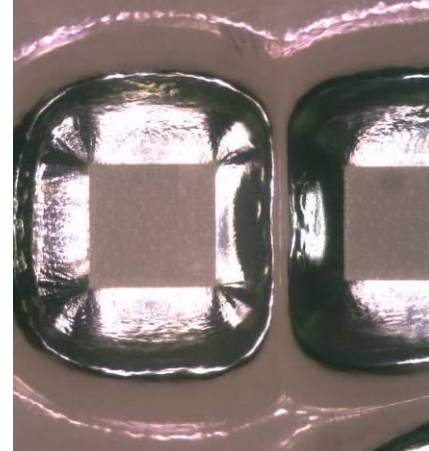


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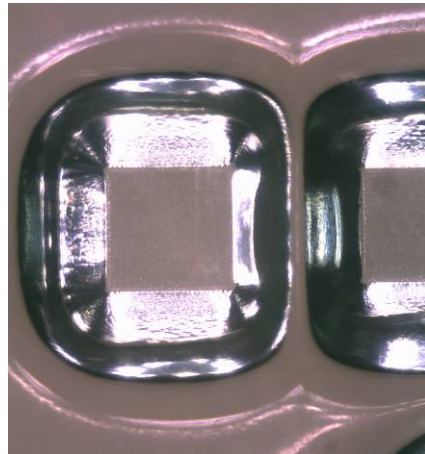
Reverse Evaluation



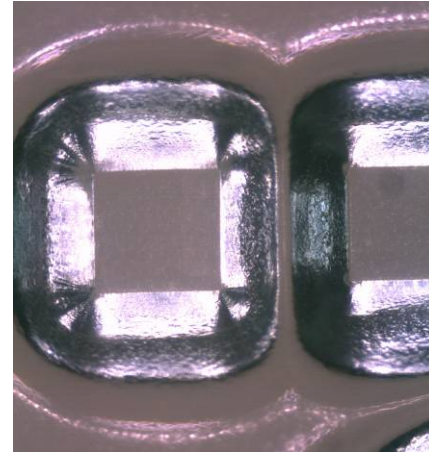
Sep. 20, 2012



Oct. 11, 2012



Nov. 1, 2012



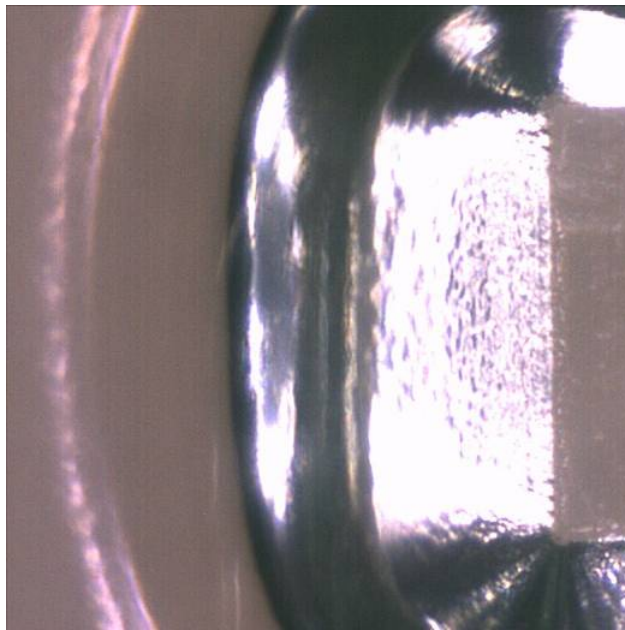
Nov. 15, 2012



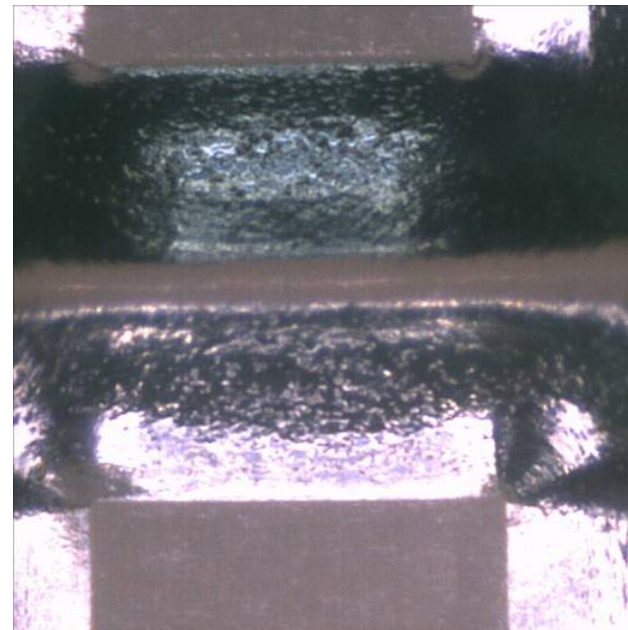
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Reverse Evaluation

- ▶ **Strong, consistent dot shoulders**
- ▶ **Clean reverses down to plate floor**



Nov. 1, 2012

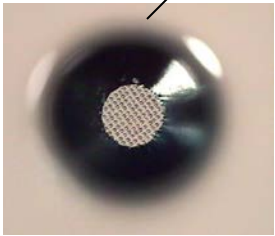


Nov. 15, 2012



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Excellent Reproduction



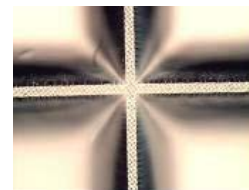
Flint Group: NEXT Label, 4000 (60), 148 (6), C21 (C2=4, B=0) (Flat Top Dot matrix, M312, D05-51-50-15-15-50 %), Document: 435 mm x 315 mm, Repeat: 305 mm



nyloflex® NEXt

The NEXt top model

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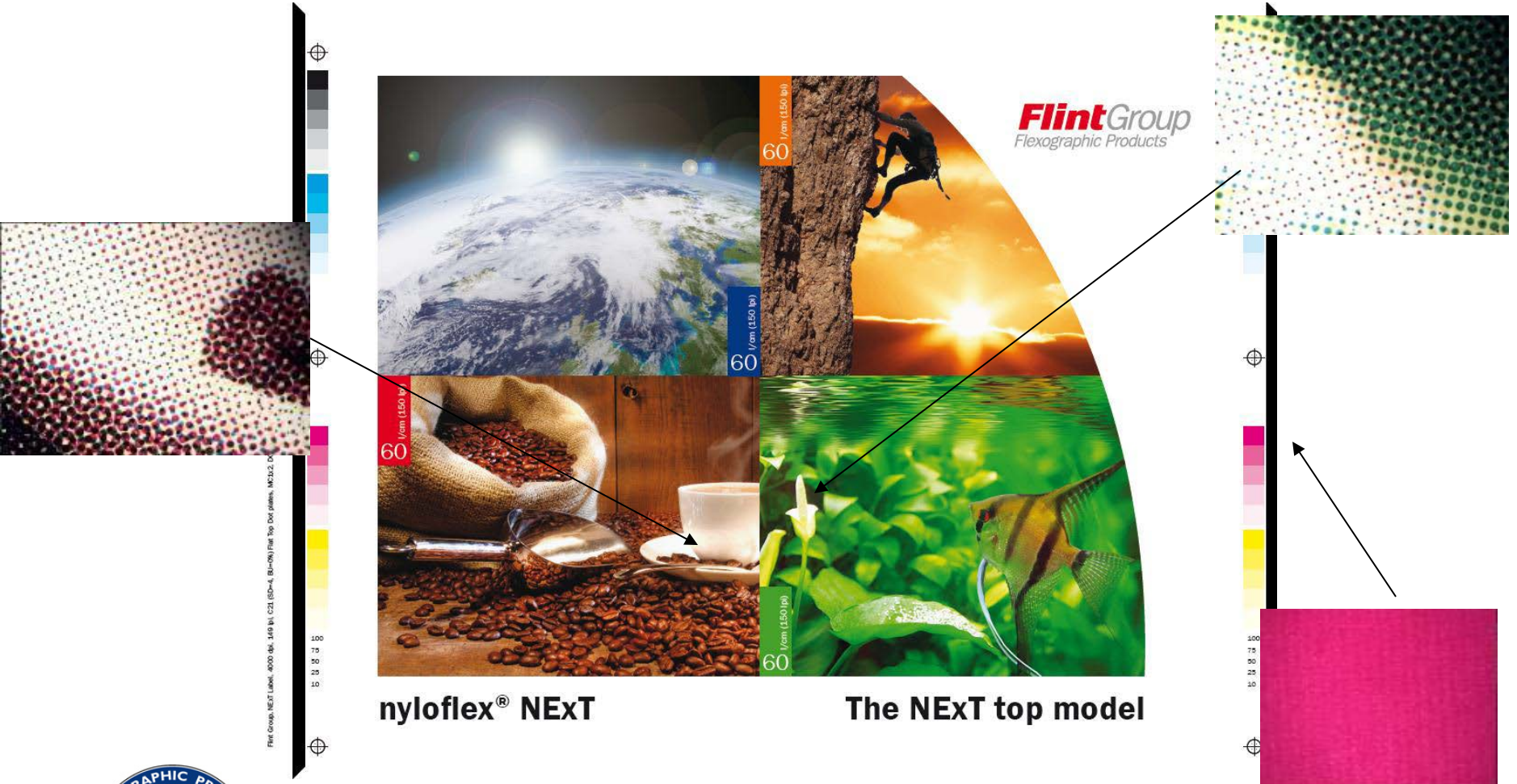


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TM

Superior Print Results



nyloflex® NEXt

The NEXt top model



TM

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nyloflex® NExT Positives

▶ Proven exposure technology

- ◆ No warm up, no degradation over time
- ◆ Speed adjustments can customize plate structure

▶ Consistent plate making results

▶ Easily integrated into the work flow

▶ Open system

- ◆ Can be used with any supplier's standard digital plate

▶ No consumables in the process



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Adapting to the Market Feedback

▶ Long Exposure Times

- ◆ UV LED Only
 - Excessive time required to image plate
- ◆ UV LED + Lamps
 - Better, but still somewhat long



▶ Modified Plate Products

- ◆ New ACE LED
 - Designed specifically for UV LED
 - Brings exposure time into more typical range
 - Same performance
 - Product for corrugated in development



Making Products and Technology That Just Work

Thank you

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Flint Group Flexographic Products
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