Color Consistency in Post Print

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Color Consistency in Post Print

- World-wide trend in corrugated Post Print:
  - More multi-color jobs
  - Quality compared to Offset Pre Print
    - → Higher color gamut
    - → Higher linecounts
    - → Higher color accuracy

- How can color consistency be optimized in corrugated Post Print?

Color Consistency in Post Print

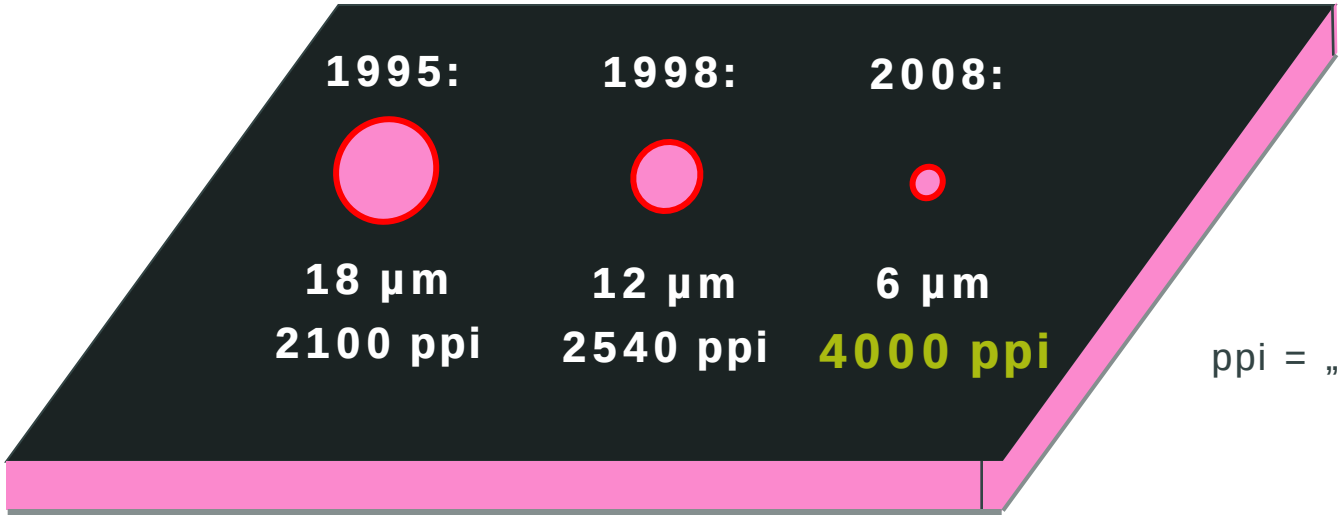
- What determines color consistency on press?
  - Tonal range
  - Linecount
  - Image contrast
  - Image details
  - Ink laydown
  - Substrate interaction (e.g. Fluting)
- Special difficulty level of corrugated Post Print:
  - Heavy forces on the press (wide-web)
  - Print on uneven substrates (wave structure)
  - Paper surfaces with different coating classes
- How can color consistency be optimized in Corrugated Post Print?

High Definition Flexo Printing

CTP Flexo – High Resolution Imaging Technology

- Higher quality requires more precise tools:

Laser dot size = „Tool size“:



ppi = „Pixel per Inch“

- What are the advantages of **4000ppi** imaging resolution?

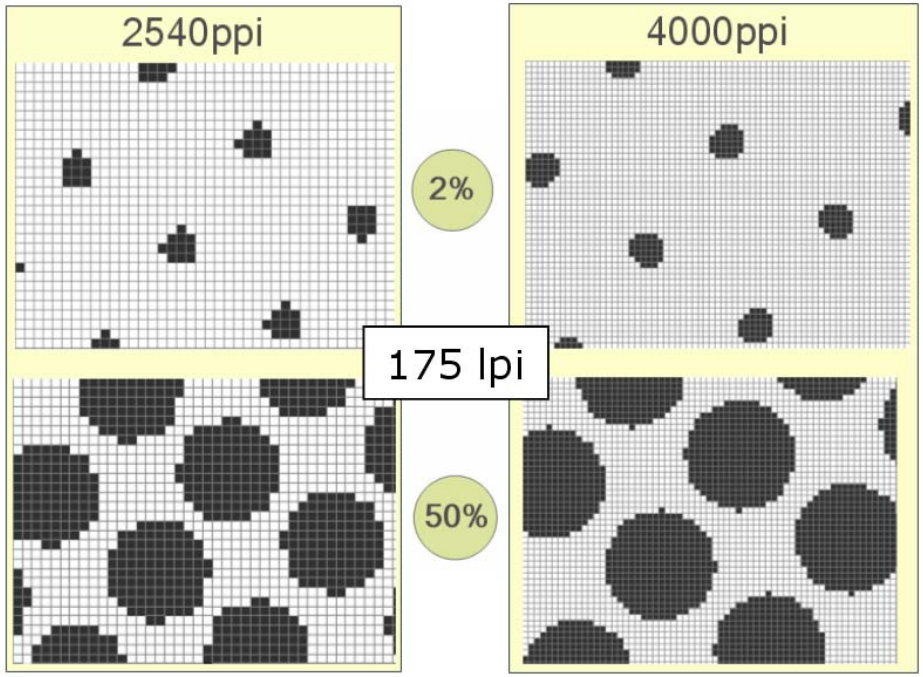
High Resolution Imaging Technology

- **Better definition** of

  → Small screening dots

  → Mid tones and dot closure area

  → Text, Linework and Barcodes



4pt 2540ppi

4pt 4000ppi

High Resolution Imaging Technology

- **Grey levels and image contrast**
  - Number of natural grey levels = $(PPI/LPI)^2$

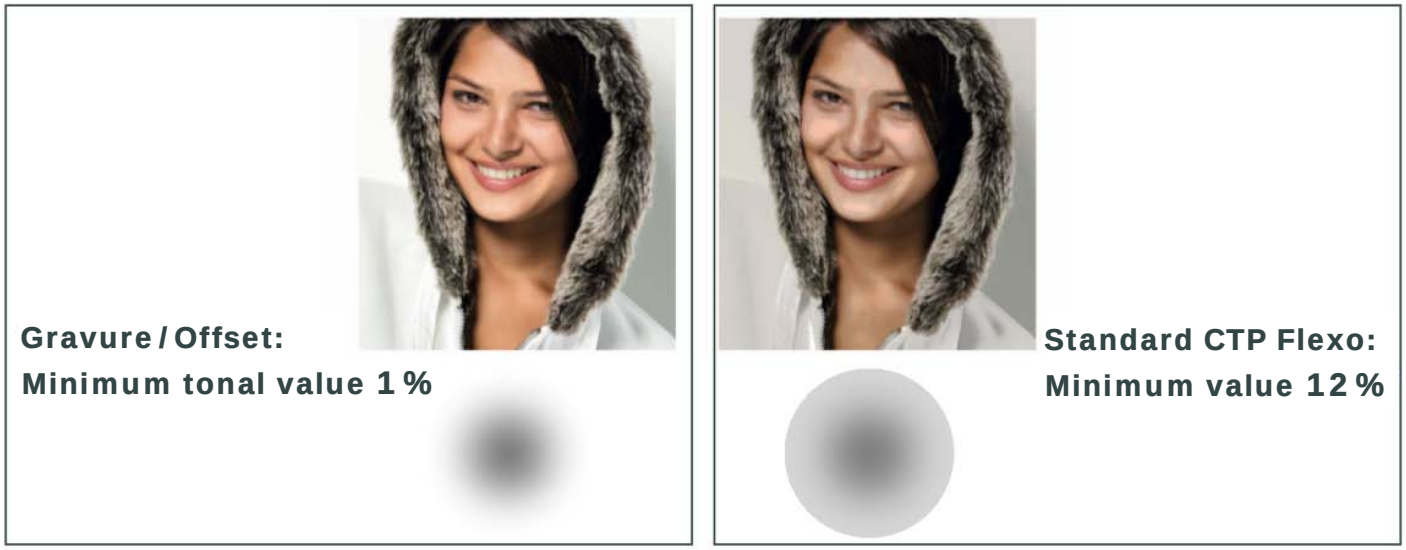
    (PPI = CTP Imaging resolution, LPI = job linecount)

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

- At the repro side, images are composed of 256 grey levels
- Natural grey levels are further reduced by dot gain compensation
- **Only 4000ppi is reproducing the full image contrast at 150lpi and above!**

Typical Flexo Problems

- 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!**

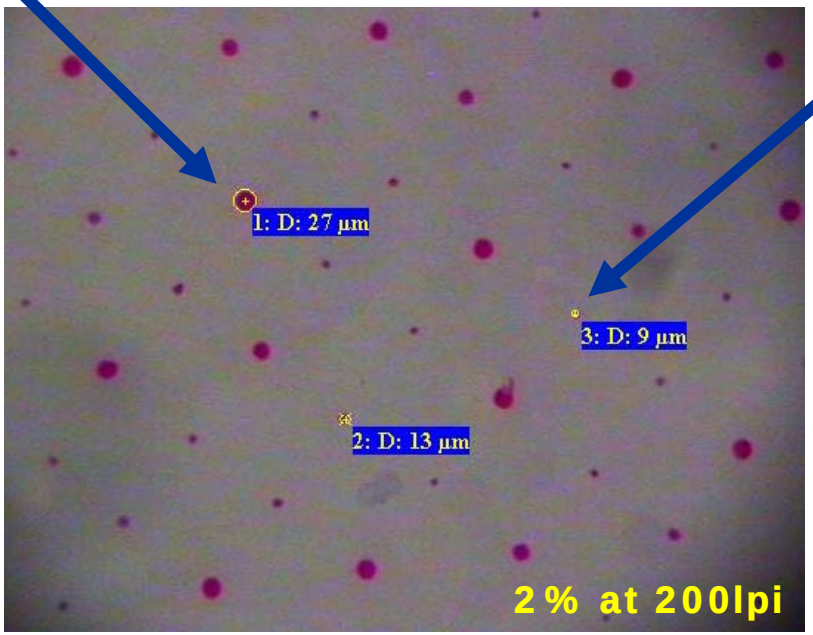
High Definition Flexo

- **Solution of the „Flexo-Problem“:**

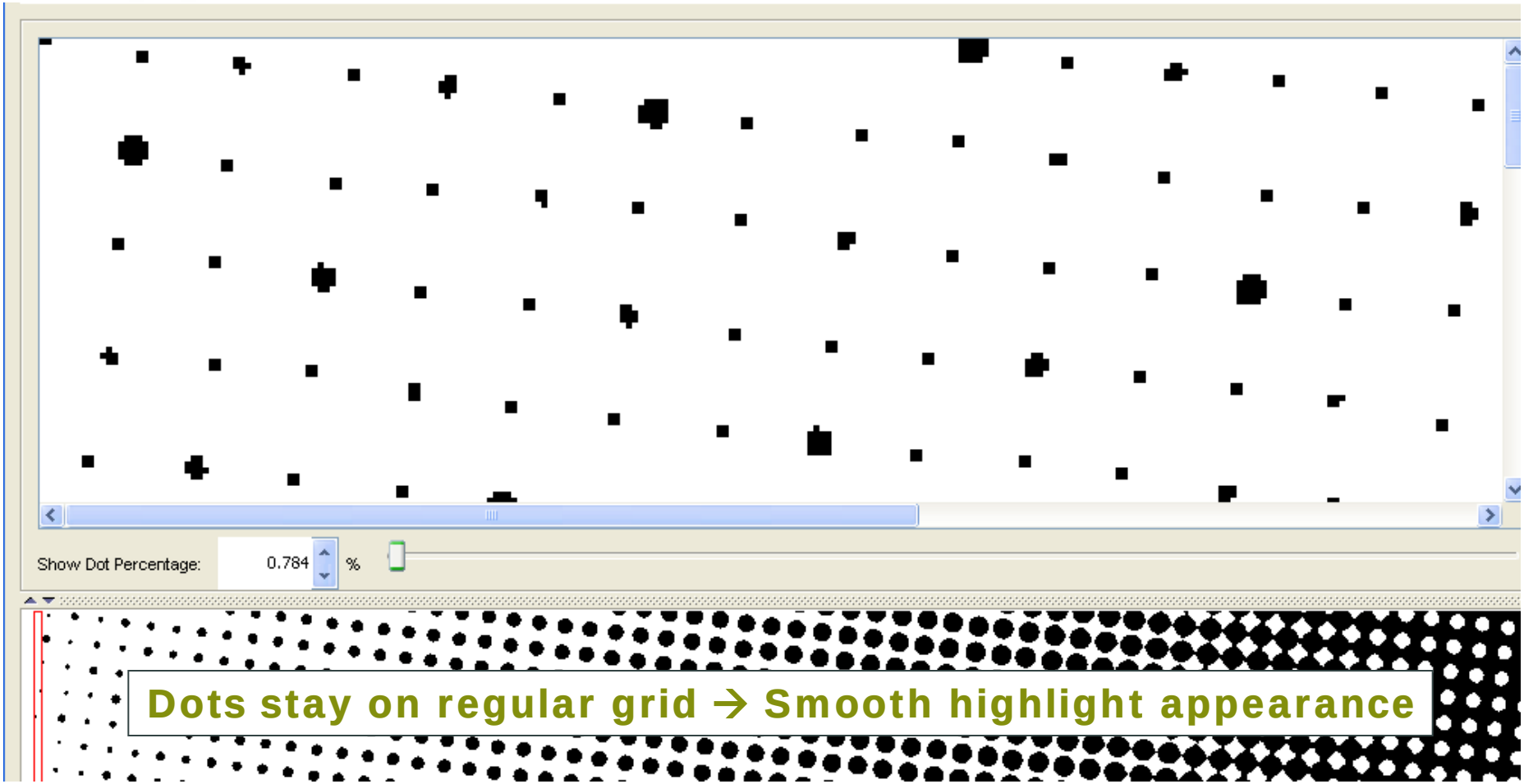
  Combination of 4000ppi und HD-Screens

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

Stable printing minimum dots



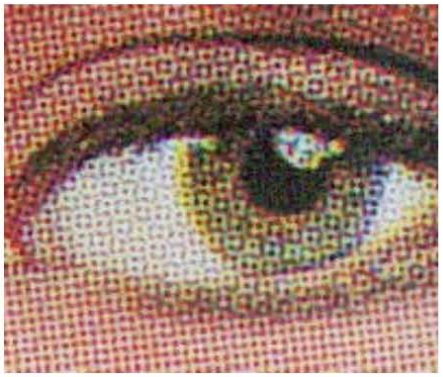
Highlight stabilization by balanced dot sizes

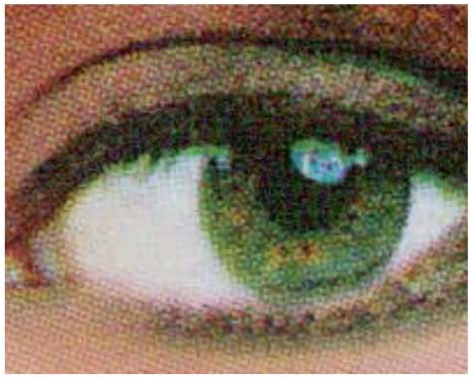


Print Quality Improvements with HD Flexo

- Print result of HD Flexo compared to Standard CTP Flexo:

Standard CTP Flexo



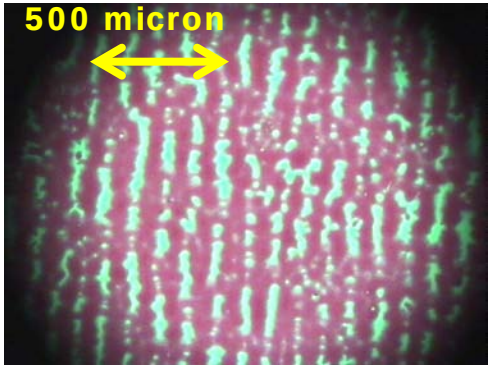


HD Flexo

Typical Flexo Problems

- Ink Laydown in Solids and Overprints

→ Flexo printing often suffers from inhomogeneous ink laydown:



Pinholes in Flexible Packaging printing
with digital flexo plates

→ Pinholes reduce the solid appearance to the human eye

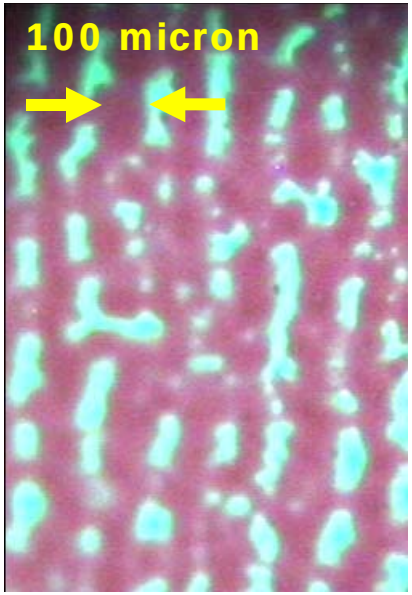
→ Overprints and pantone color emulations become uneven and checky

→ White underprints and overprints become less opaque

HD Flexo – Solids and Shadows

- **Solution to the ink laydown problem:**

  → **Micro Screening of flexo plate surfaces**

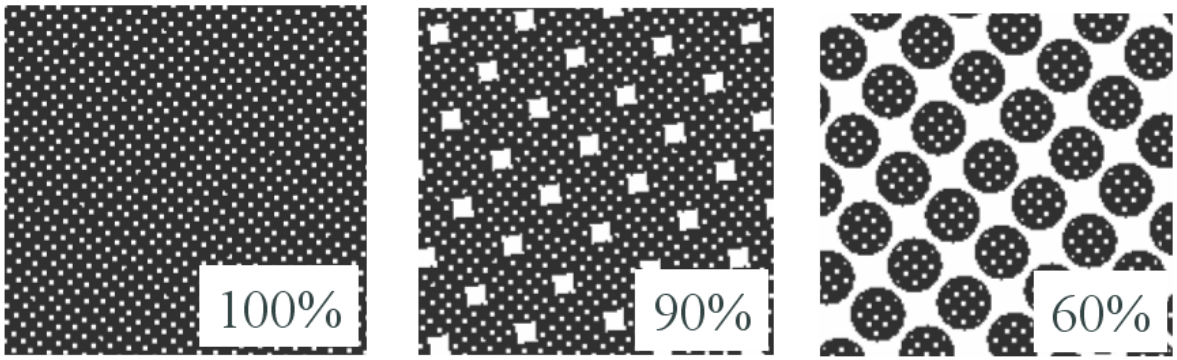


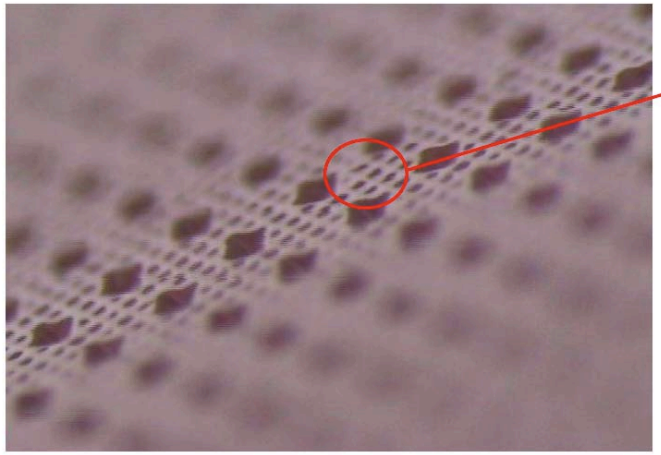
Solid printout with standard plate surface

Solid printout with Micro Screening on plate surface

HD Flexo – Solids and Shadows

- Microcell screens are working in solids and screening dots





75% tint with Microcells on processed plate

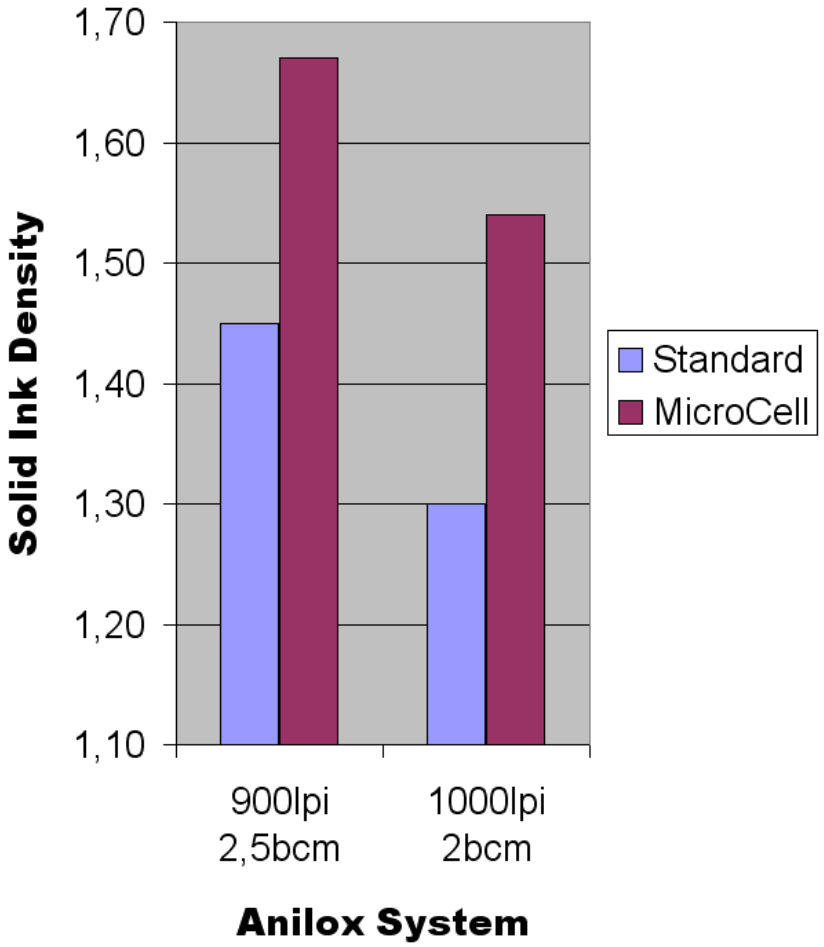
HD Flexo – Solids and Shadows

- MicroCell results depend on:
  - Choice of cell structure:
    - Cells for pinhole closing → **same solid ink density (SID)**
    - Cells for higher ink transfer → **higher SID level**

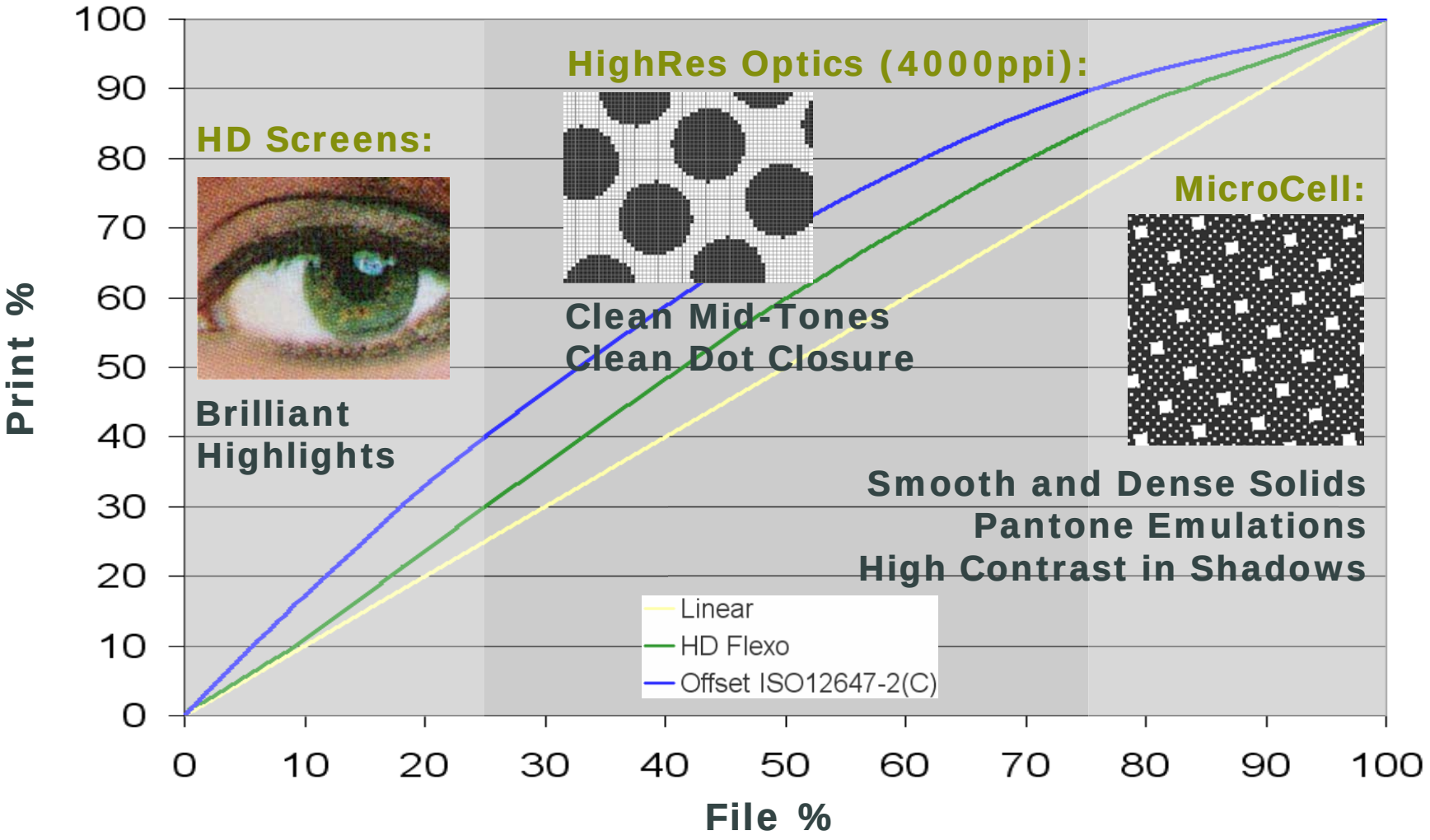
    → BUT **higher SID** means **higher ink consumption** on press…
  - Substrate
    - PE, LDPE, paper, …
  - Ink system
    - Solvent inks, water based inks, …
  - Ink composition
    - Extender, retarder, additives, …
  - Digital Flexo plate type

HD Flexo – Solids and Shadows

- MicroCells for higher SID level in Flexible Packaging:



HD Flexo – Quality Boost in Entire Tonal Range



HD Flexo in Label Printing

- What can you achieve in Label printing today?
  - Higher screen ruling (150-225lpi) → avoid Flexo rosettes
  - Smooth fades to zero → compete with Offset
  - Increased image contrast → picture brilliance
  - Matching Offset and Digital Print → go for the best economics

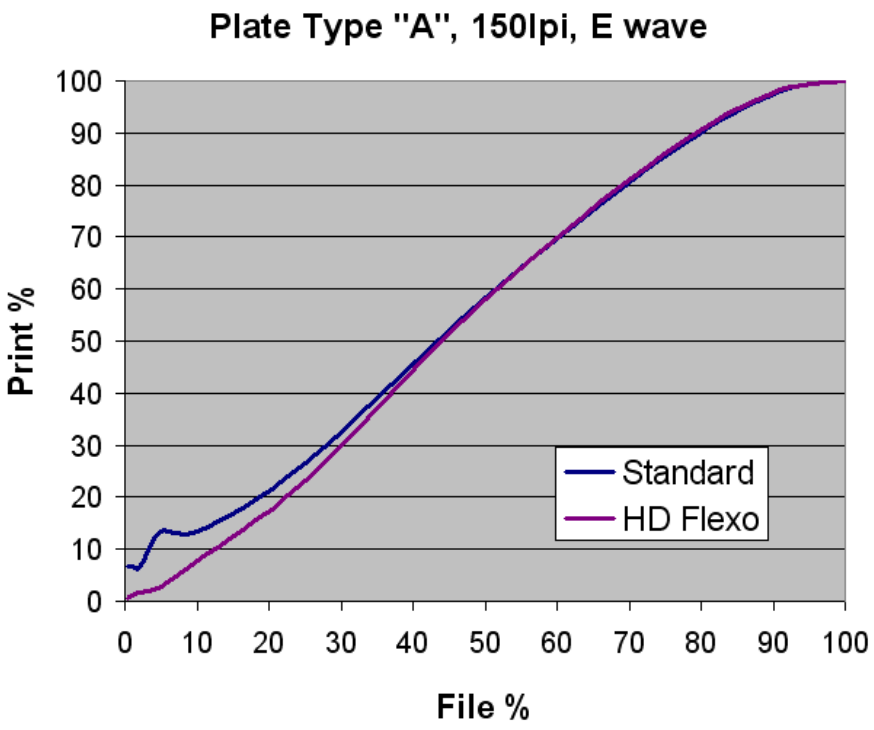
HD Flexo in Flexible Packaging Printing

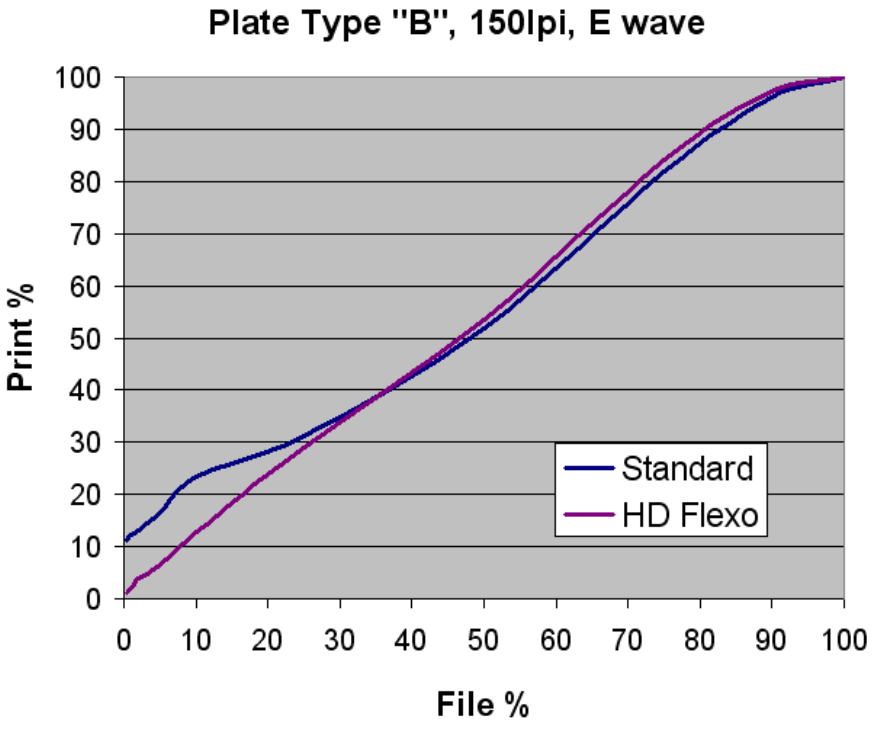
- What can you achieve in Flexible Packaging printing today?
  - Higher screen ruling (150-200lpi) → compete with Gravure
    Increased tonal range
    Clean vignettes
  - Increased image contrast → picture brilliance
  - Better ink laydown → vivid colors / no pinholes
  - reduce number of plates → single white underprint / CMYK

How does High Definition Flexo Printing improves Color Consistency in Post Print?

HD Flexo in Corrugated Post Print

- HD Flexo result in corrugated Post Print (112mil digital plates):

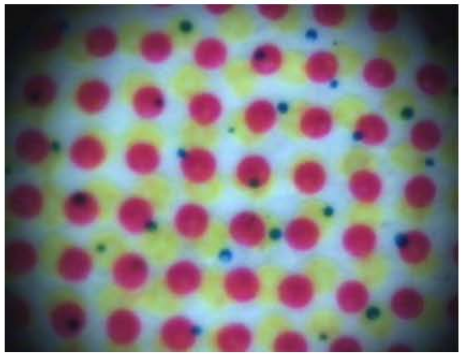


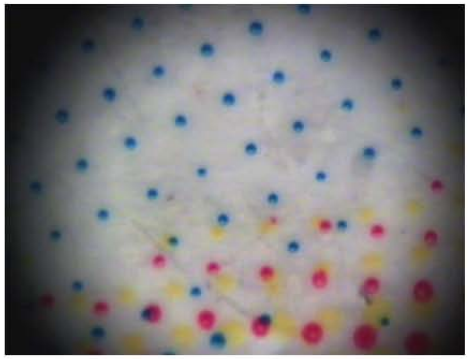


HD Flexo in Post Print: Dot Definition

- Results like Offset Pre Print:

150lpi on F wave





Highlight dot definition

HD Flexo in Post Print: Detail Sharpness

- Results like Offset Pre Print:

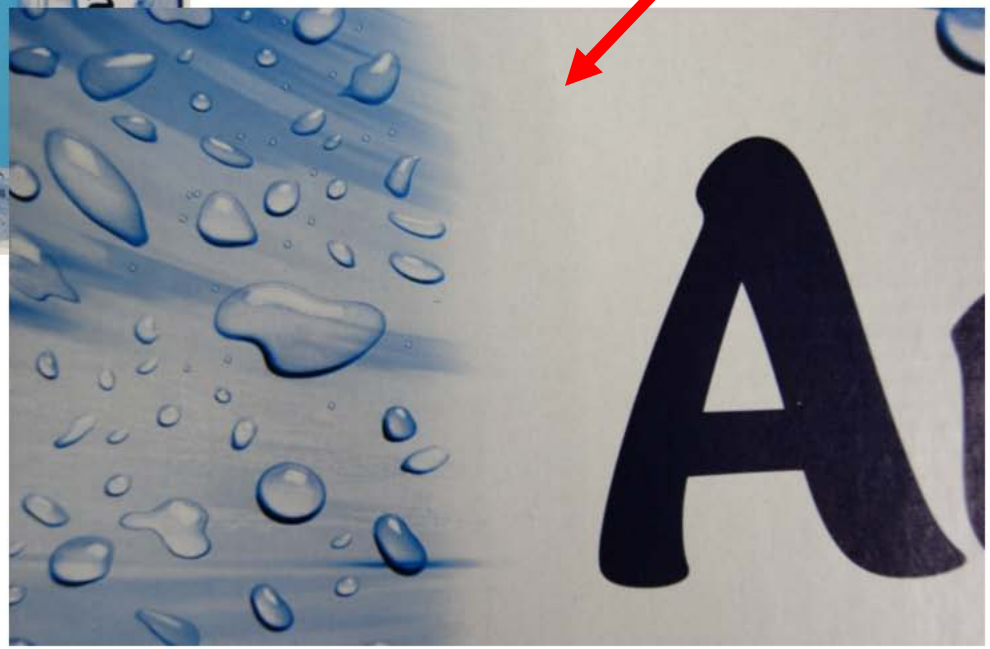
150lpi
on E wave

Detail sharpness

HD Flexo in Post Print: Transitions to Zero

- Results like Offset Pre Print:

Transition to zero

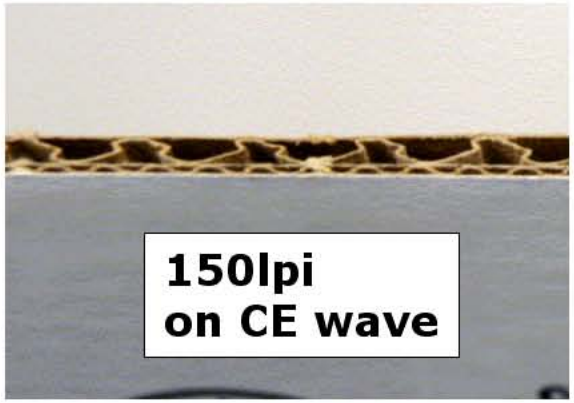


150lpi
on E wave

HD Flexo in Post Print: Results on CE Wave

- Results like Offset Pre Print:

80“



HD Flexo in Post Print: Results on CE Wave

- Results like Offset Pre Print:

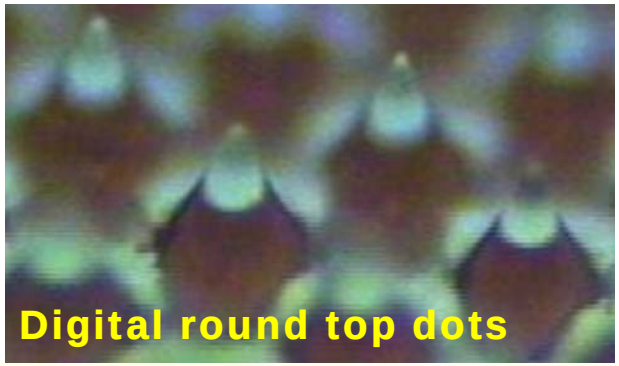
150lpi
on CE wave

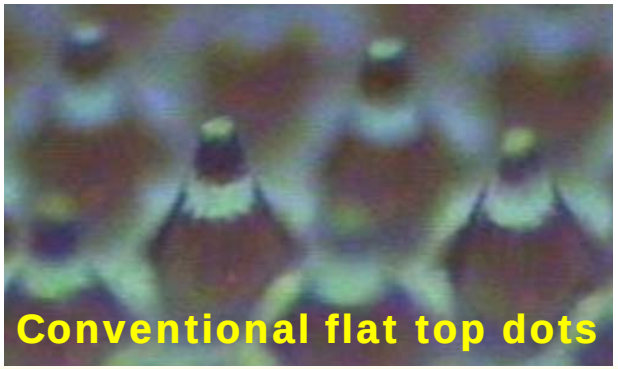
HD Flexo in Post Print: Fluting

- Fluting:
  - Visibility of the substrate flute in print
  - Depends on substrate type (wave)
  - Effect increases with higher LPI

- What can we do about it?
  - **Optimal sandwich of flexo plate type and mounting foam**
  - Special mid-tone screening
  - Flat top dot geometry can also reduce fluting

    → BUT is also increasing highlight dot gain significantly…



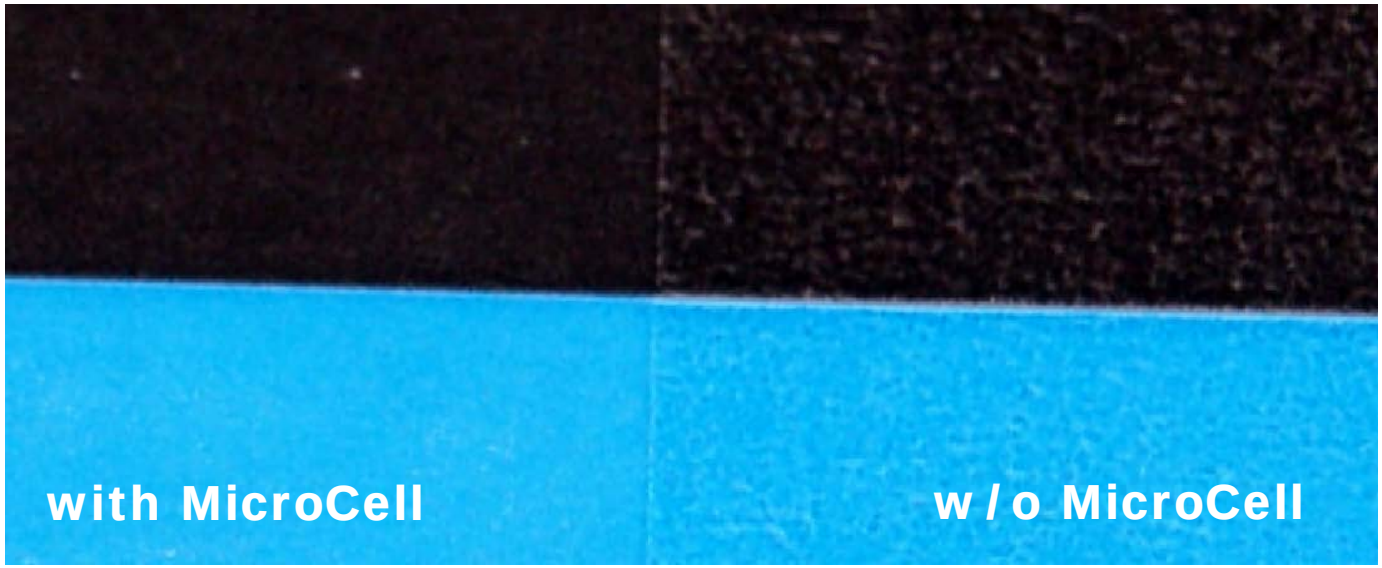


HD Flexo in Post Print: Fluting Reduction

- HD Flexo **150lpi on B-Wave** printed with **standard digital** flexo plate and **optimal plate / foam sandwich**:

HD Flexo in Corrugated: Ink Laydown Improvements

- MicroCell results:
  - Ink laydown in corrugated Pre Print
    - Paper structure gets significantly smoothened
    - SID improvement possible (+0,1 ... +0,2)



  - for Post Print: Testing started...

HD Flexo in Corrugated Post Print

- Already a large variety of jobs in daily production …

HD Flexo Requirements for Post Print

- Linecounts: 120lpi ... 150lpi
  - 150lpi delivers best dot stability
- Suitable Digital Flexo plate type
  - Application guidelines available
- Digital Flexo plate thickness: 112mil
  - Higher plate thickness is reducing highlight quality
- Digital Flexo plate type and mounting foam adapted to each other
  - Application guidelines available
- Anilox system for 150lpi:
  - CMYK lineature 800+ lpi with volume 3 bcm or lower
  - Spot colors 550+ lpi (transitions to zero limited)
- Press with good mechanical accuracy
  - Impression and register

HD Flexo - The new Flexo Quality Standard

- **Over 200 customers world-wide are using HD Flexo:**
  - **Labels**, 95 Installs
    - Vignettes to zero
    - Avoid Flexo rosettes (high LPI)
  - **Flexible Packaging**, 112 Installs
    - Improves contrast and vignettes
    - Eliminates pinholes
    - Increases SID and ink laydown to obtain vivid colors
  - **Corrugated**, 18 Installs
    - Better highlights and higher LPI
    - Reduced fluting
    - Higher color consistency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