# Smart Tools for Total Flexo Quality Management

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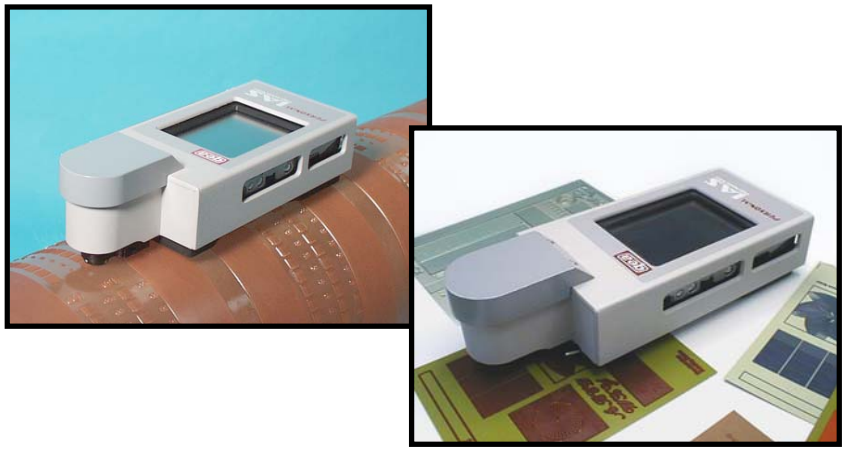
# Flexo Quality Management Tools from QEA

**Flexo IAS®** - An all-in-one toolbox for transmissive read on film, mask, and plate; as well as reflective readings on print

**FlexoLite™** - For transmissive read on film and plate



**Flexo-M™** - For reflective read on CTP sleeve and mask; ITR (In-the-Round) products, metal-backed plate, and direct laser engraved plate and sleeve

# Benefits

- **Portable**

  **Handheld design for measurements anytime, anywhere!**

- **User-friendly**

  **Live images with touch-screen user interface for quick and easy operation!**

- **Critical Data**

  **Critical information such as dot%, line screen, and screen angle enable quality control BEYOND density and color!**

- **Variable Plate Size and Characters**

  **Freedom to measure anywhere on a plate and different plate thickness, color, and materials!**

- **Stand-alone Use or Interface with PC**

  **Built-in system for independent use or link with PC for data and image transfer via USB connection!**

- ***and…***

**The Ability to Control the ENTIRE Flexo Workflow!**

qea

# The Design

High magnification (5µm/pixel) digital microscope with a color CCD. Built-in illumination or external backlight comes with different models.

USB and serial interface with PC allows easy transfer of data and images.

Powered by Windows® CE based Pocket PC® with built-in advanced image analysis software for objective measurement of image quality.

# Measurement Procedure

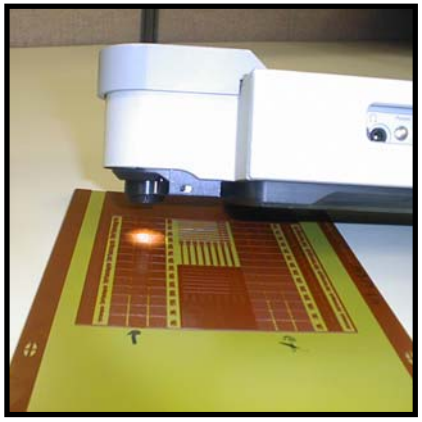
## Flexo IAS® and FlexoLite™

❶ Place the measurement sample over the backlight of a Flexo IAS® or FlexoLite™

❷ Position the tool over the area of interest

❸ Make a measurement using the built-in software

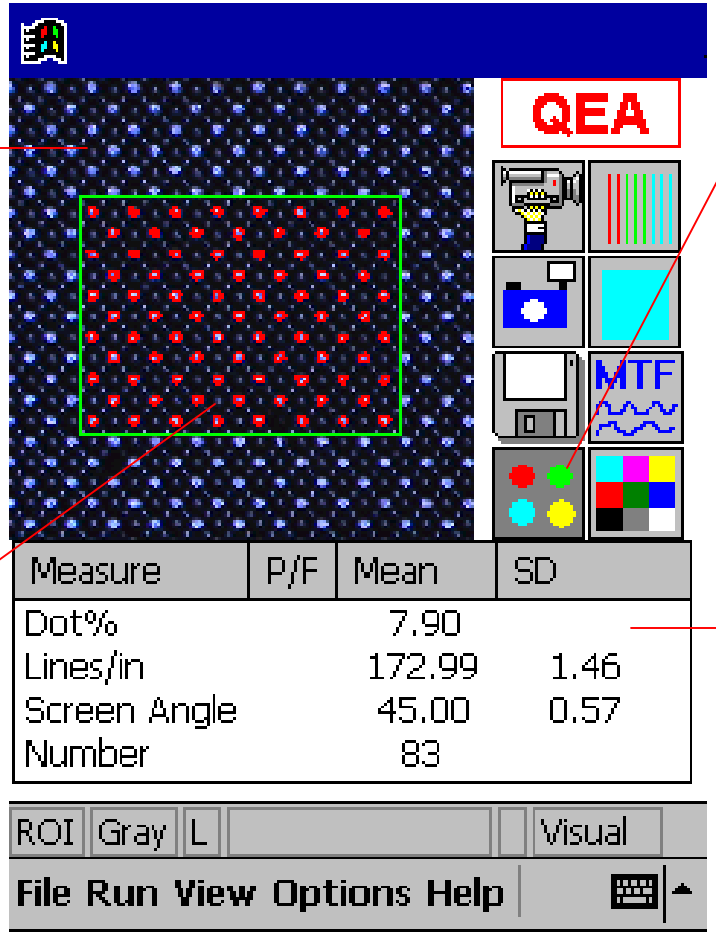
## Flexo-M™



# User Interface

❶ A live video image is displayed while the user positions the device.

❷ The user defines a region of interest or initiate a point-to-point measurement on the touch screen.




❸ Analysis is initiated by tapping one of the measurement buttons.

❹ A single frame of the object is captured and enhanced with overlays to highlight features. Numerical results are displayed immediately on the main screen.

# Measurement Results

| | Flexo IAS® | FlexoLite™ | Flexo-M™ |
|---|---|---|---|
| **Dot% and Area%** (AM or FM screen) | X | X | X |
| **Line Screen** (line/cm or line/in) | X | X | X |
| **Screen Angle** (deg) | X | X | X |
| **Dot Quality**<br>Diameter<br>Area<br>Perimeter<br>Circularity<br>Box Ratio | X | X | X |
| **Line Quality**<br>Line Width<br>Line Density<br>Edge Raggedness<br>Blurriness<br>Contrast<br>Fill<br>Angle<br>Distance<br>Discontinuity | X | | X |
| **Area Quality**<br>Reflectance / Transmittance<br>Visual Density<br>Graininess<br>Mottle | X | | |
| **Color L*a*b* and Density** | X | | |
| **Tone Reproduction**<br>Reflectance / Transmittance<br>Density<br>% Area Coverage<br>Gray Balance<br>Dot% (Murray-Davies)<br>Print Contrast | X | | |
| **Resolution** (MTF - Modulation Transfer Function) | X | | |

# How Can I Use the Measurement Results?

- **Incoming QC**

  **Characterize incoming materials!**

- **Fingerprinting**

  **Establish profiles of press, ink and accessories!**

- **Problem Solving**

  **Trace down the source of a printing problem based on comparative results!**

- **Process Control**

  **Monitor the quality from film, plate to the final print!**

- **Research & Development**

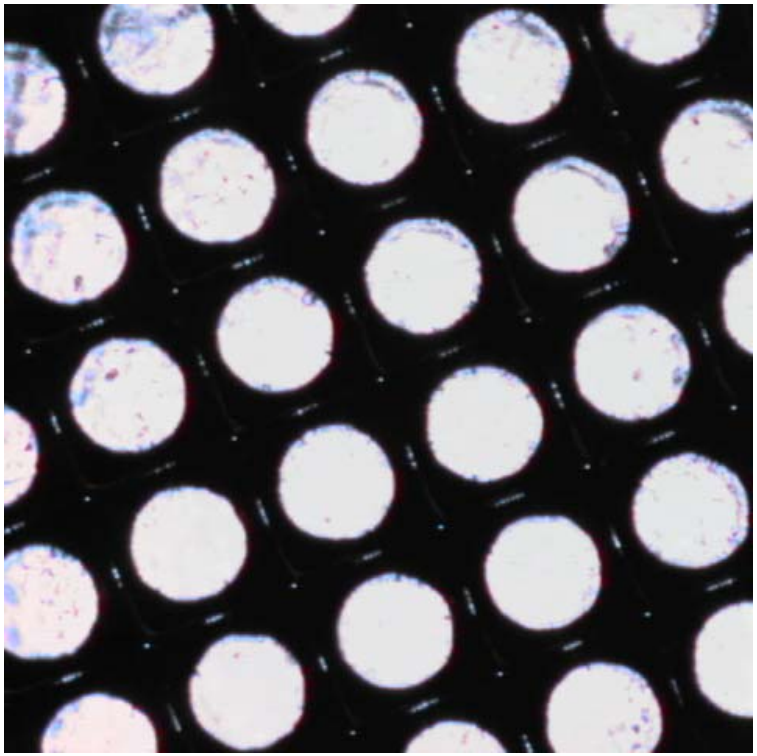
  **Improve process time and product quality based on established measurement results!**

- **Marketing & Benchmarking**

  **Compare the quality of your product against your competitor's!**

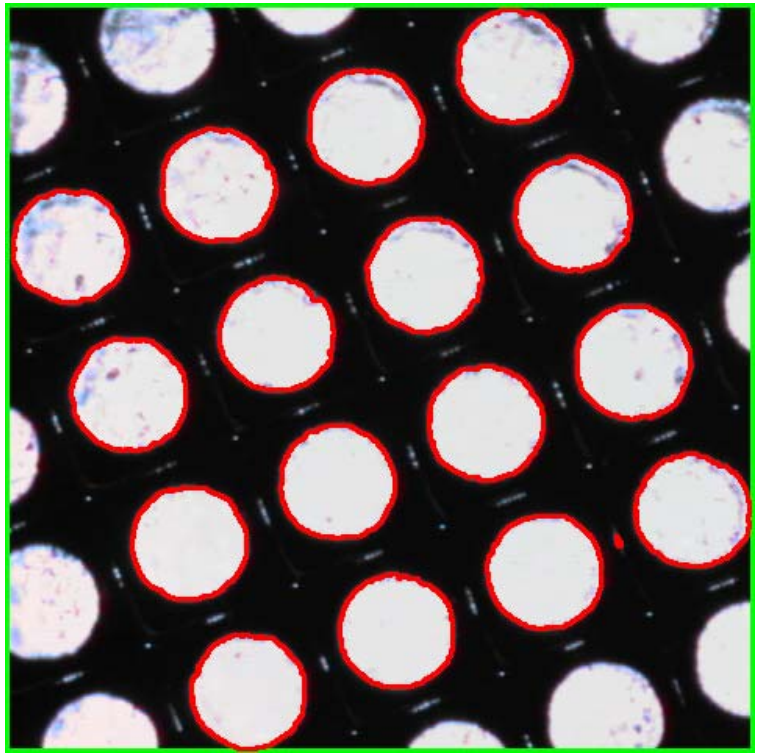
# Let's Take a Look at Some Application Examples…

# Dot Gain Analysis of A Digital Plate



**Original Image**

**Tint Value = 50%**

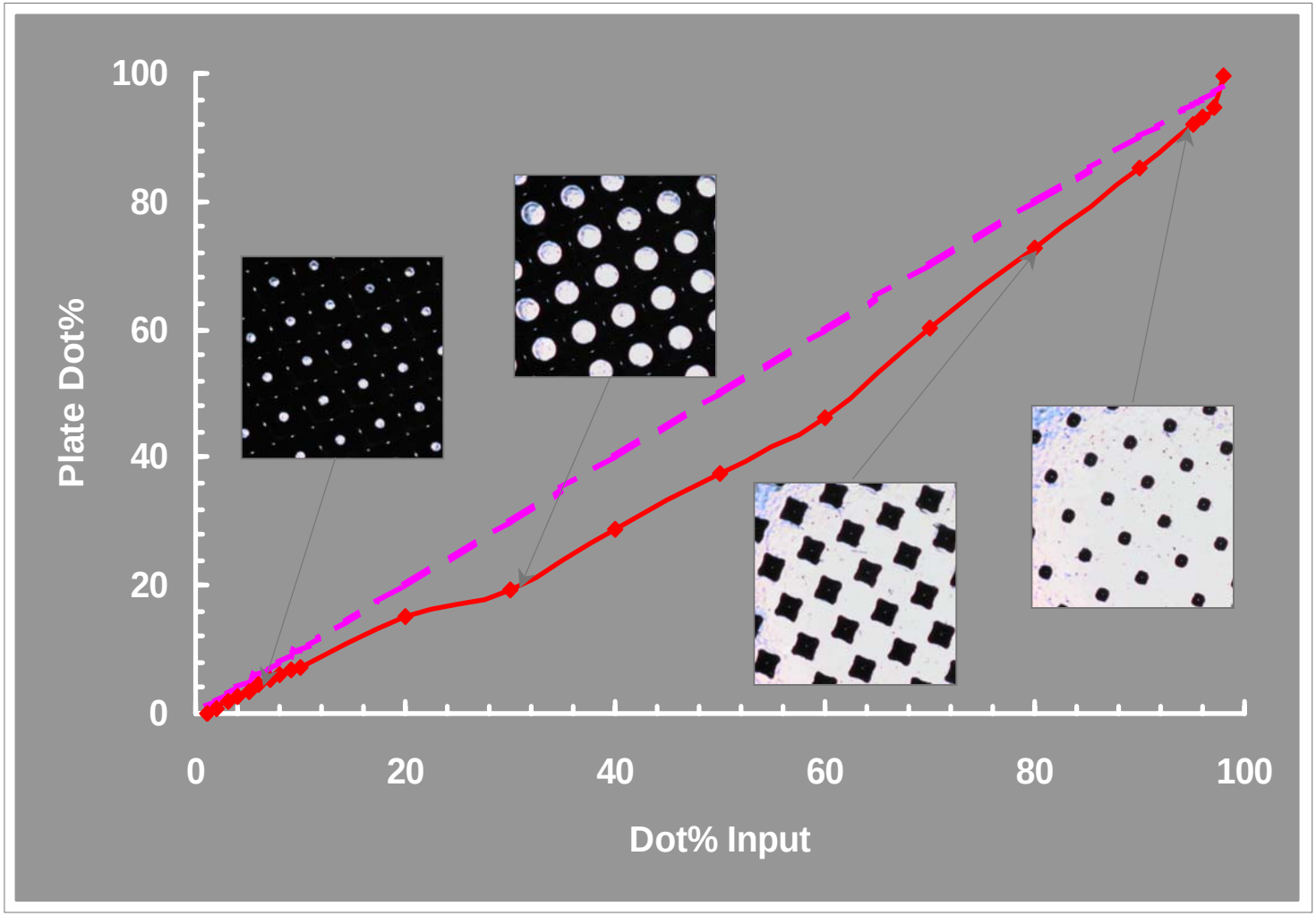


**Analyzed Image**

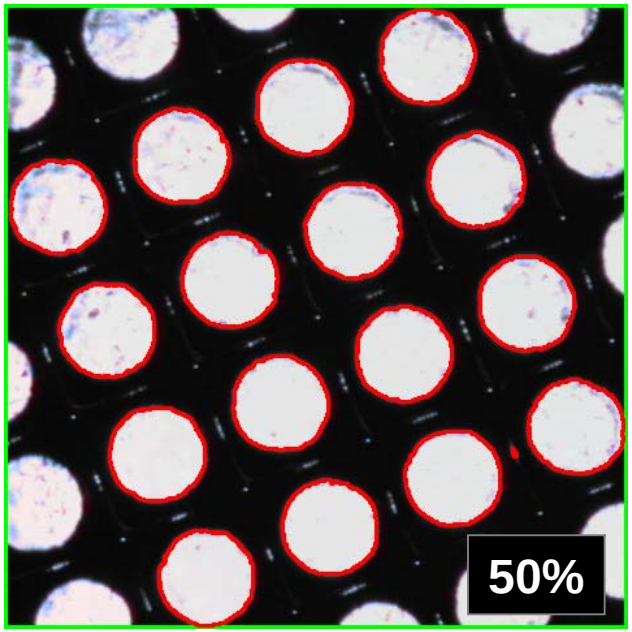
**Dot % = 37.96%**

**A Dot Shrinkage of 12.04%!**

# Dot Gain Analysis of A Digital Plate



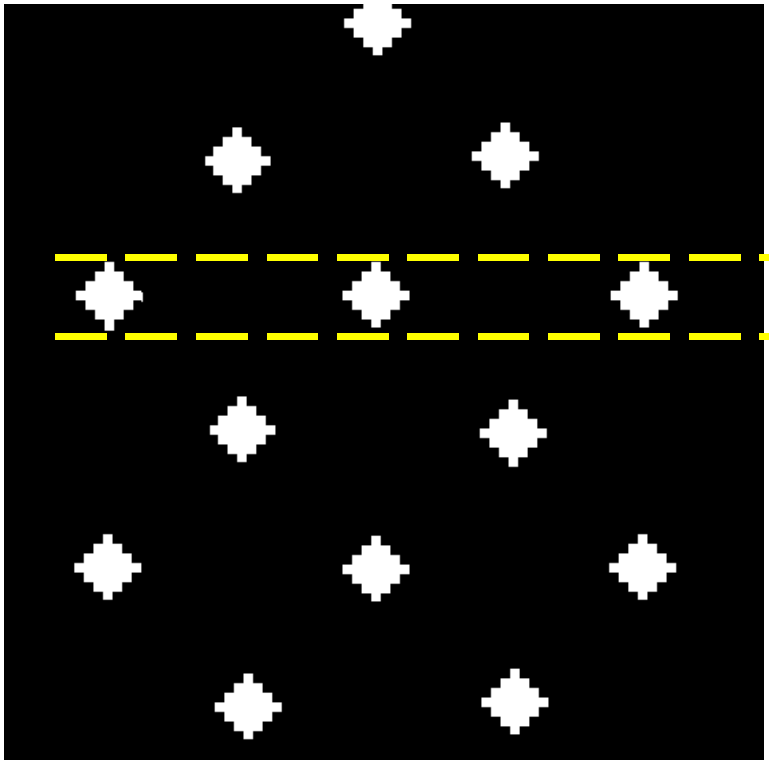
# Other Analysis Results

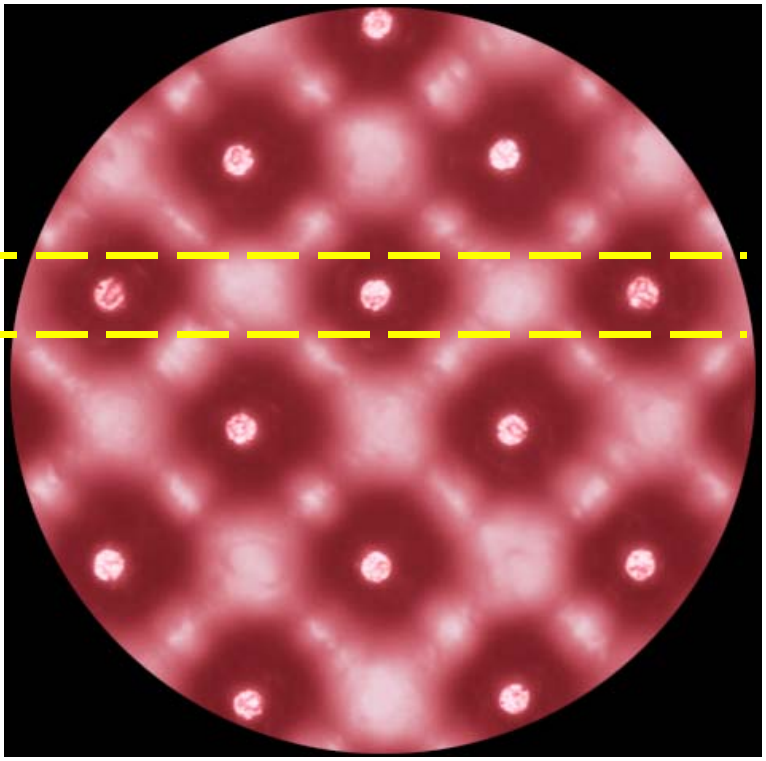



| | Mean | Stdev |
|---|---|---|
| Dot% | 37.96 | |
| Lines/in | 58.8 | 1.08 |
| Screen Angle | 68.17 | 0.34 |
| Area (μm²) | 70824.45 | 18177.58 |
| Diameter (μm) | 292.48 | 70.17 |
| Perimeter (μm) | 980.01 | 235.61 |
| Circularity | 1.13 | 0.02 |
| Box Ratio | 1.05 | 0.25 |
| Number of Dots | 17 | |

# A Digital Mask Example

# Quantifying Both the Mask & Plate Can Provide Useful Insight





**Mask Dot: 8%**

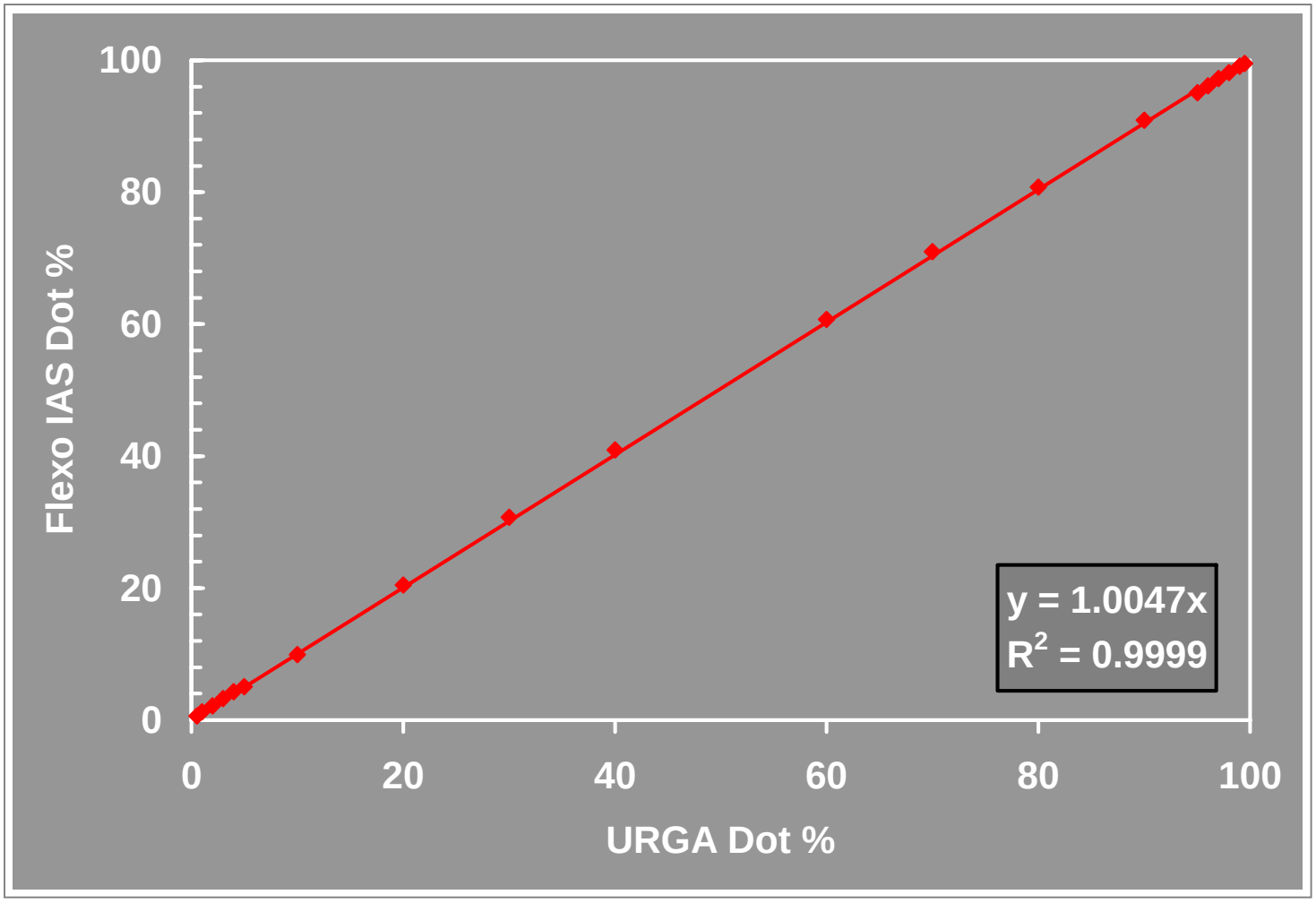
**Plate Dot: 2%**

**A Dot Shrinkage of 6%!**

# A Film Example Using the UGRA Plate Control Wedge

**60 lines/cm Halftone Wedge**

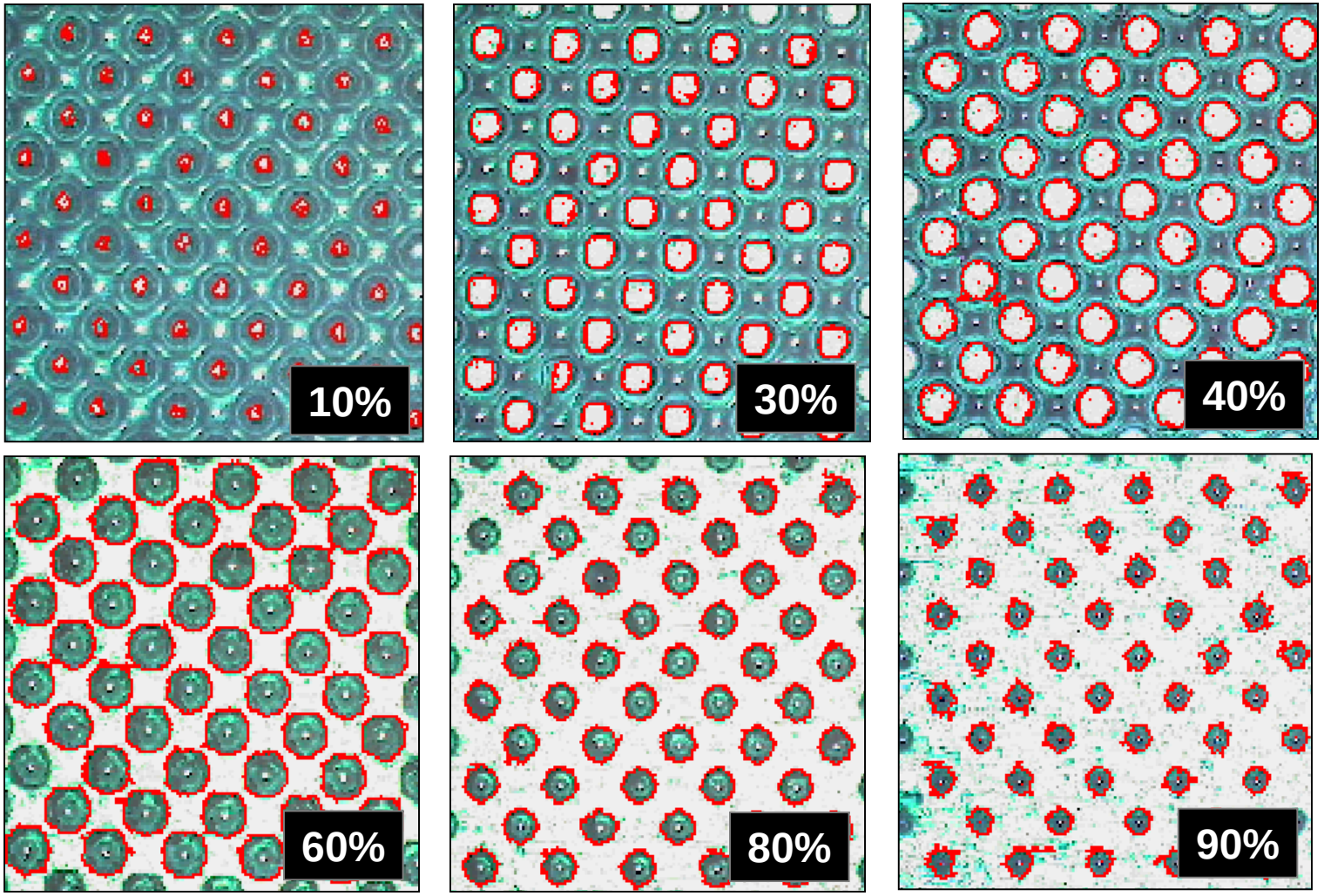
# This Example Demonstrates the Accuracy in Film Dot% Measurements



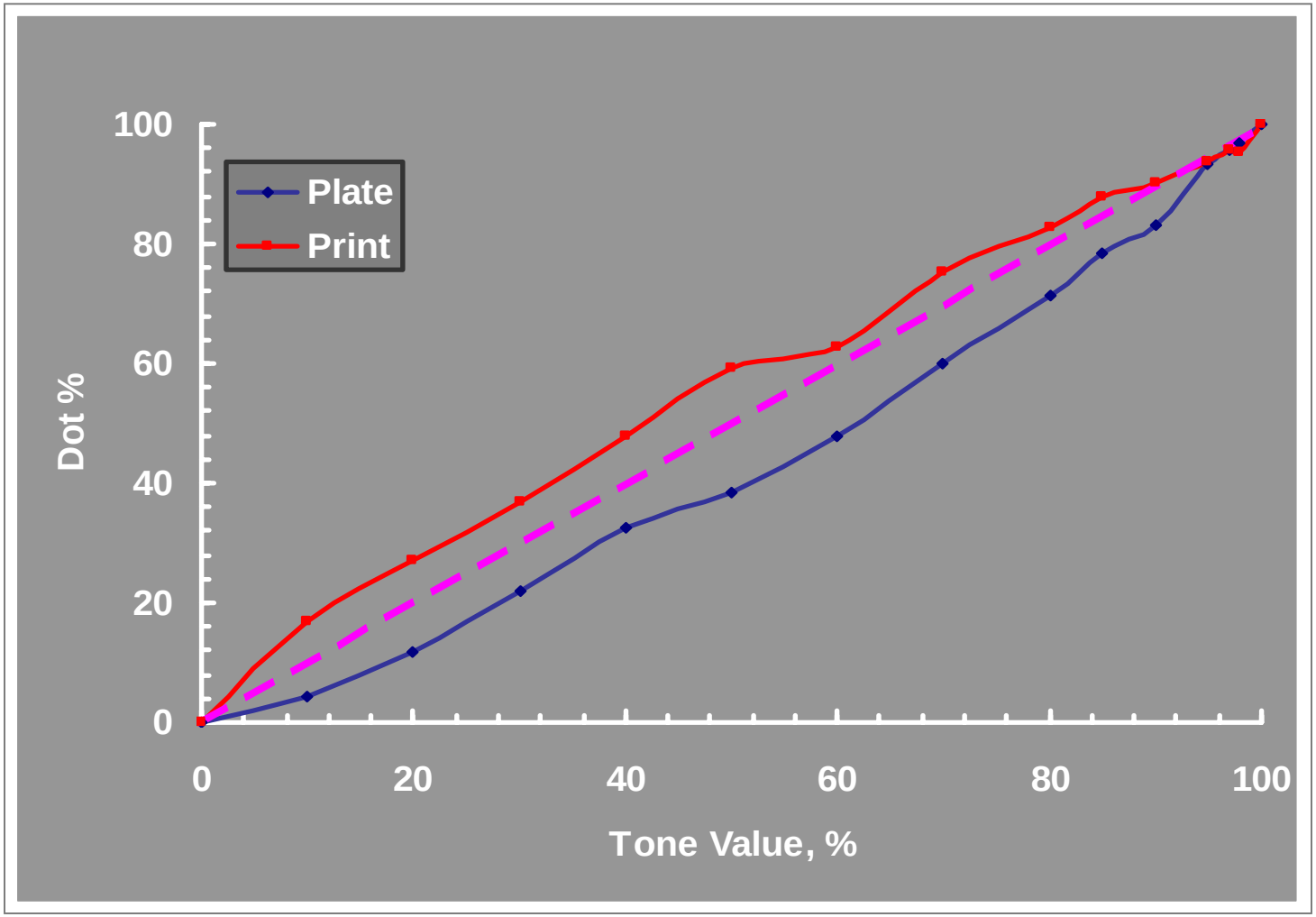
# How About Difficult-to-measure Substrates Such As Sleeves and Metal-backed Plates?

**These substrates are analyzed using an innovative reflective lighting technology built-in the Flexo-M™**

# A Newsprint Plate Example



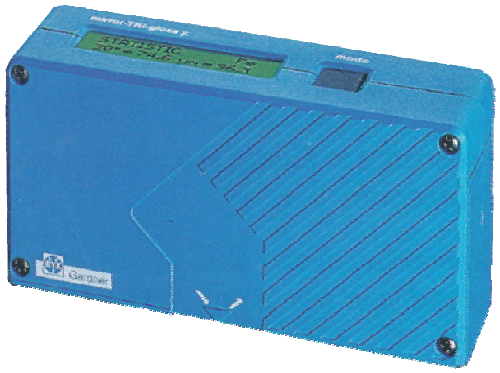
# A Dot Gain Comparison between Newsprint Plate and Print



# Let’s Talk about Print Quality Analysis

**Print Quality can be measured using the Flexo IAS® system, enabling you one more level of control!**

# The Flexo IAS® Offers Control Beyond Density and Color!



a Glossmeter

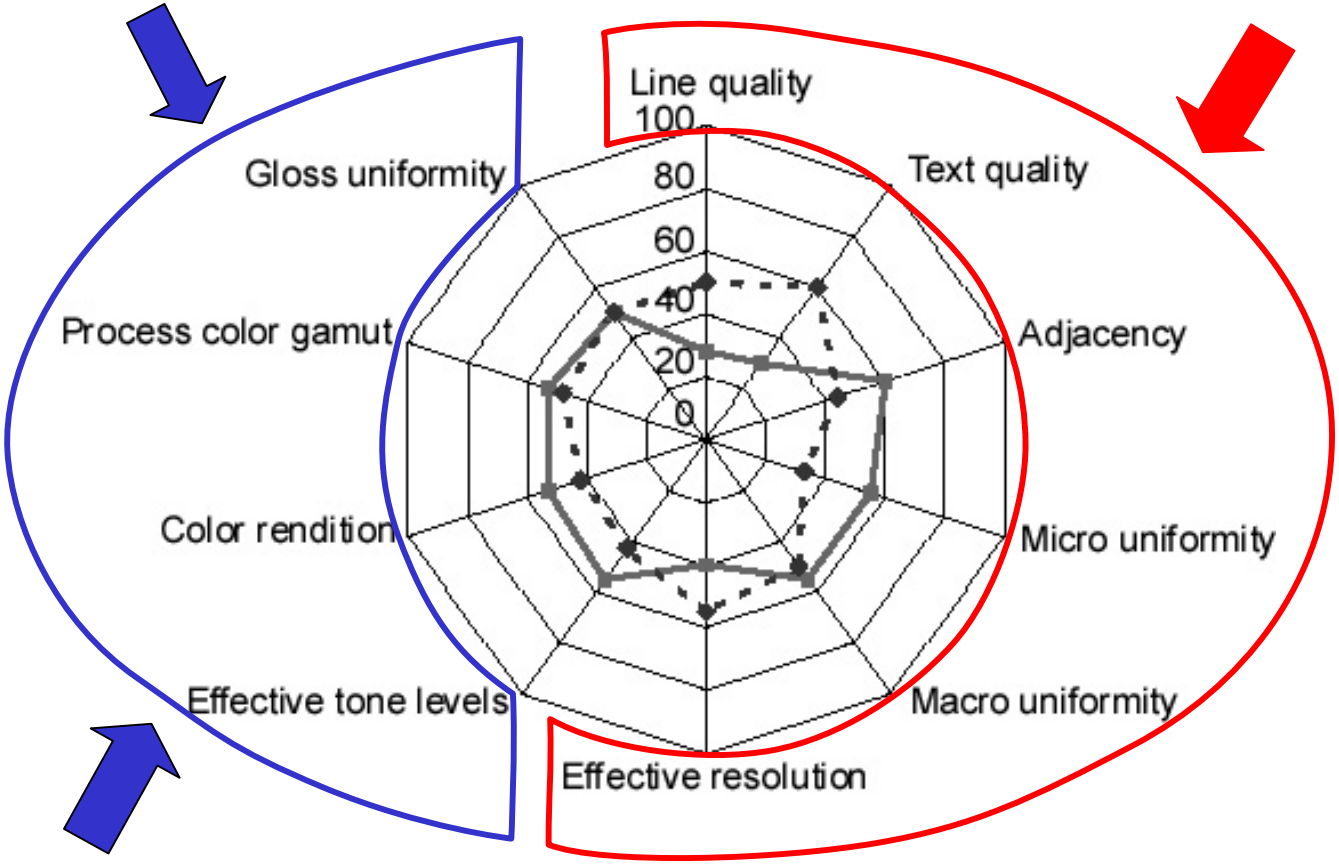
+

a Spectrophotometer

# What Can I Measure with the Flexo IAS®?

**Glossmeter**

**Flexo IAS®**

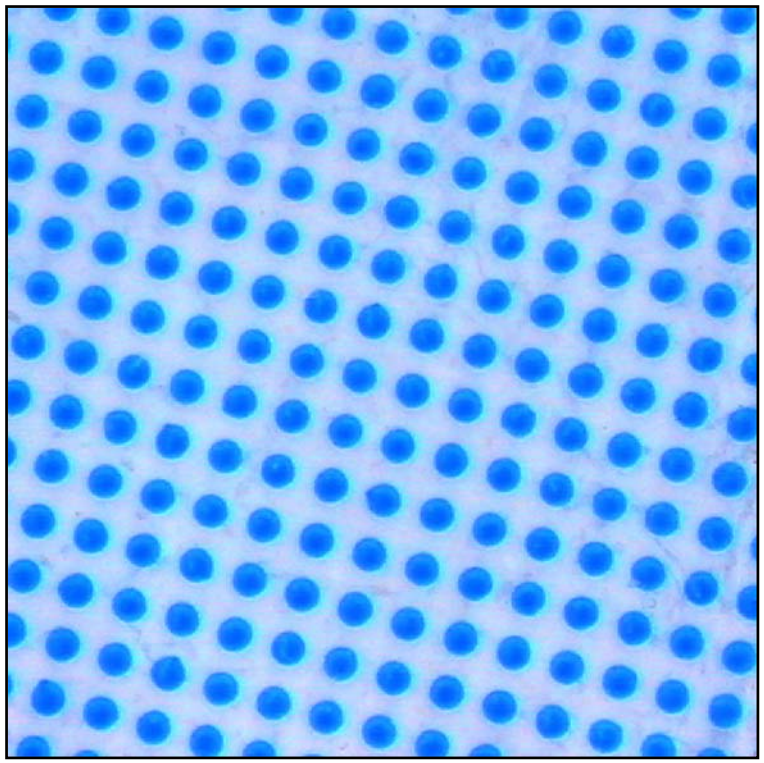



**Spectrophotometer**

E. N. Dalal, et al., "Evaluating the Overall Image Quality of Hardcopy Output," Proc IS&T's PICS, May 17-20, 1998, pp 169-173

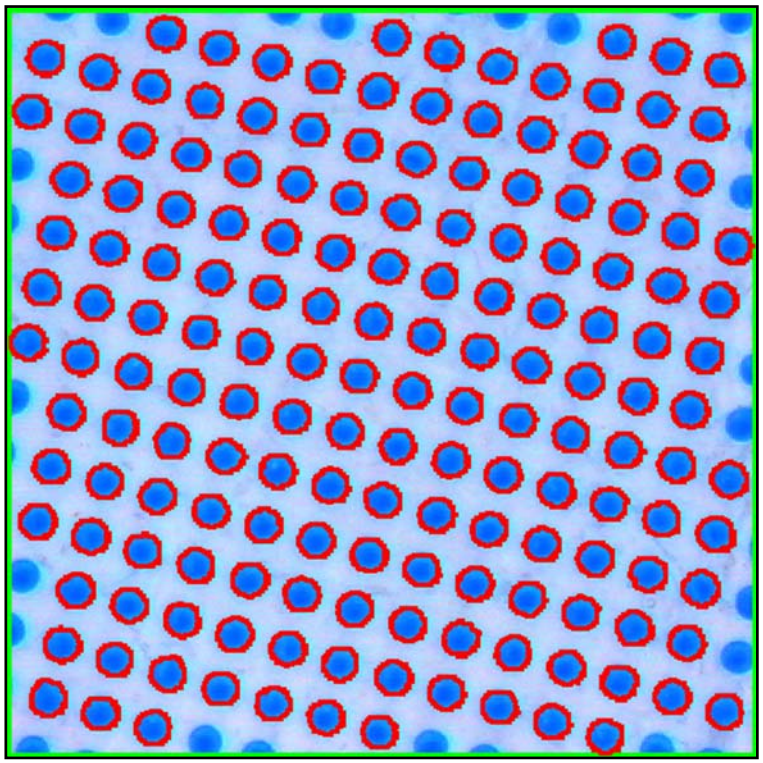
# Examples of Dot Analysis

# Dot Gain Analysis of the Final Print



**Original Image**

**Tint Value = 30%**

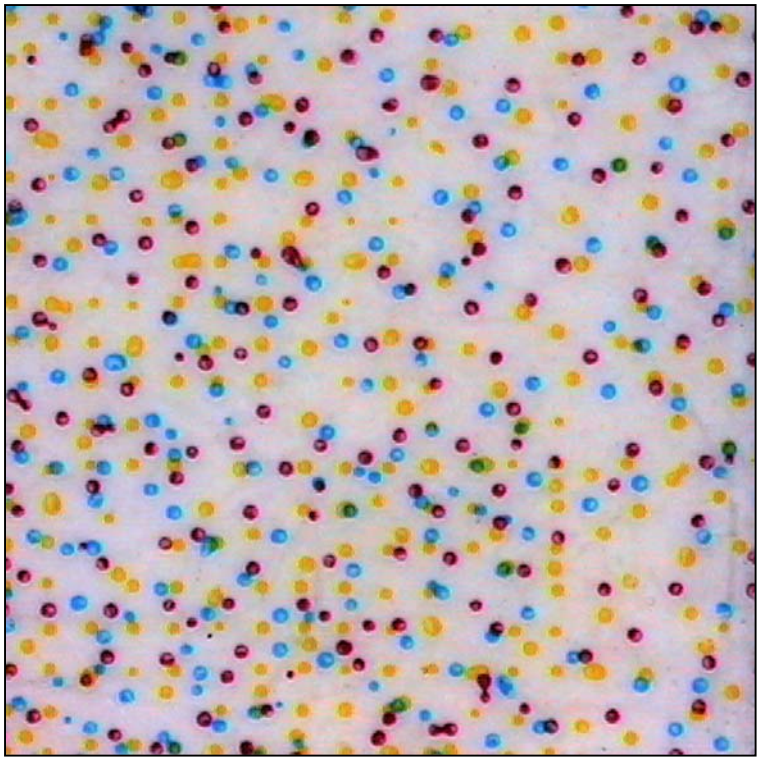


**Analyzed Image**

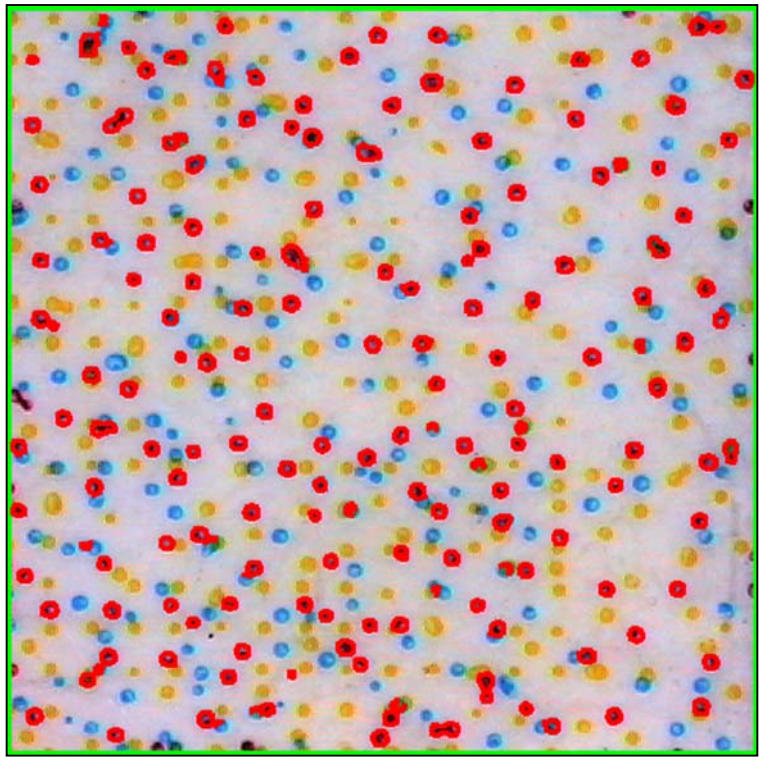
**Dot % = 31.5%**

**A Dot Gain of 1.5%!**

# Area Coverage Analysis of Hybrid & Stochastic Screens



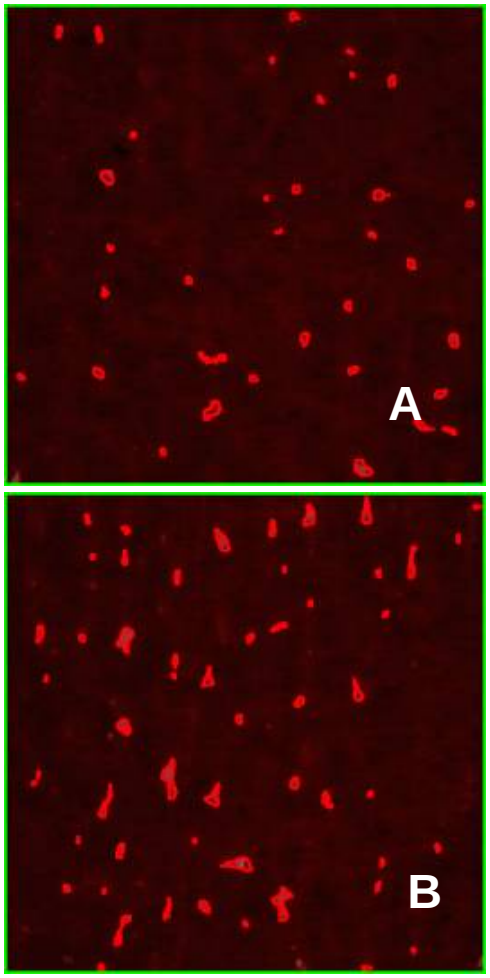
Original Image



Analyzed Image (Magenta Dots)

**Dot% = 5.9%**
**Dot Size = 44.1µm**

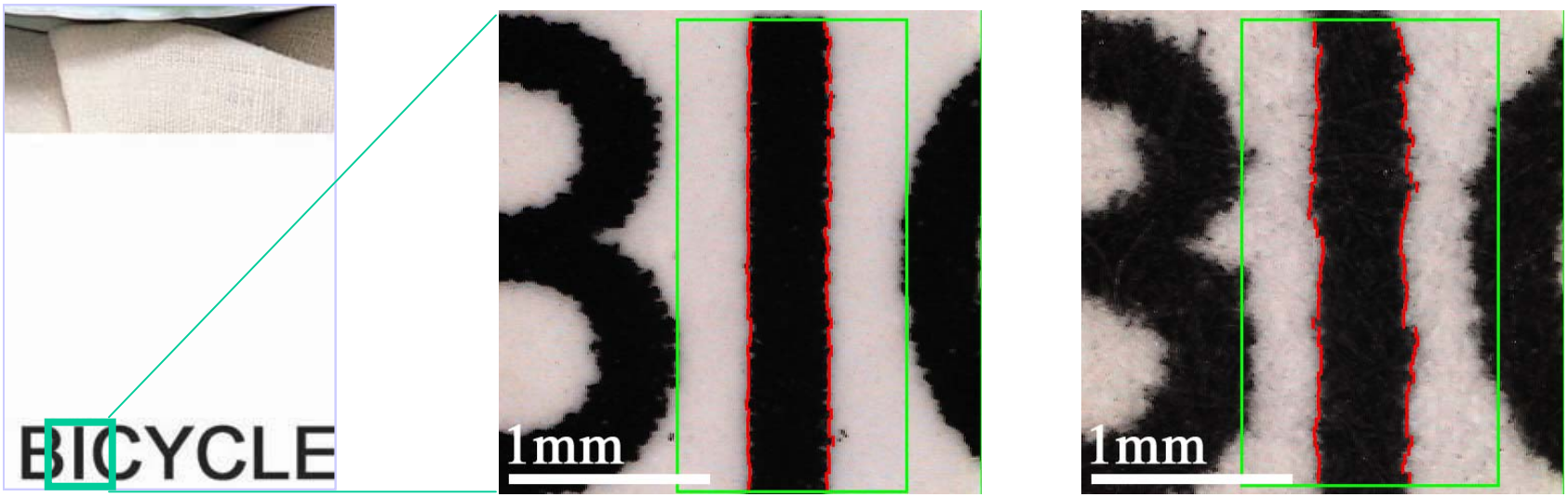
# Quantifying Pin-holes (Fisheyes)




| | A | B |
|---|---|---|
| No. of Pinholes | 34 | 54 |
| Diameter (μm) | 39.9 | 42.3 |
| Area ($\mu m^2$) | 1398.1 | 1724.3 |
| Perimeter (μm) | 149.9 | 175.6 |
| Box Ratio | 1.11 | 1.88 |
| Circularity | 1.41 | 1.58 |

# How About Line Quality?

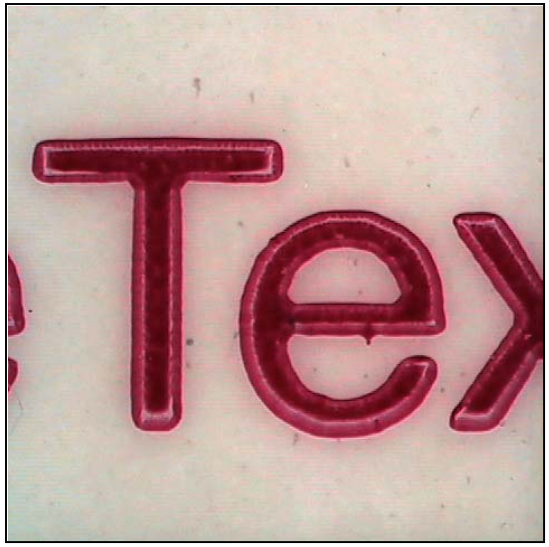
# Bleed Analysis & Media Benchmarking

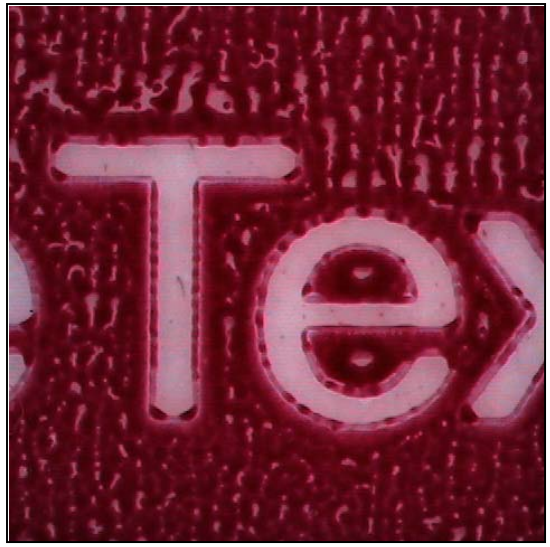



| | Media A | Media B |
|---|---|---|
| Stroke Density | 1.38 | 1.06 OD |
| Stroke Width | 387 | 434 µm |
| Stroke Raggedness | 6 | 18 µm |
| Stroke Blurriness | 64 | 87 µm |

**Media B has lower stroke density, and wider stroke width due to wicking (bleed). Also greater raggedness, and blurriness.**

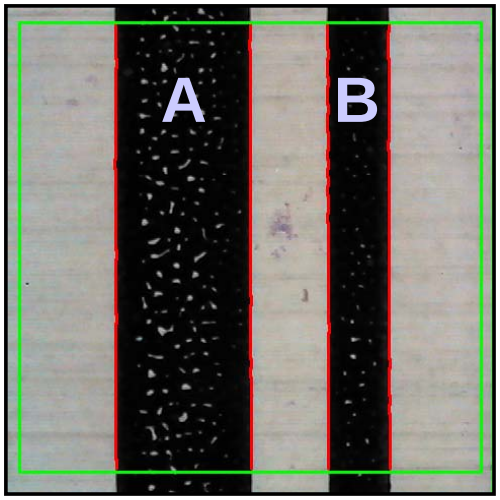
# Text Quality Analysis





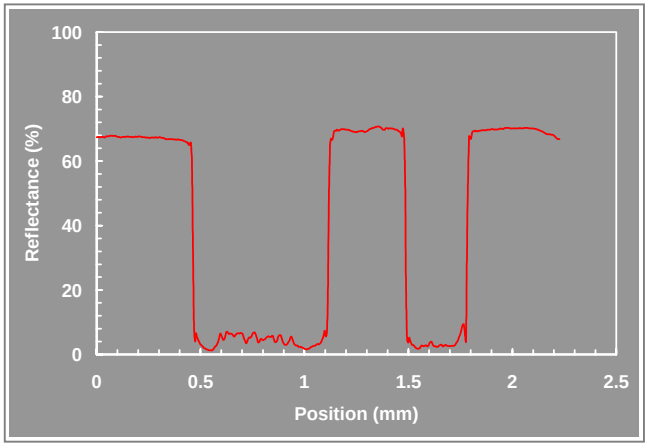
| Line Quality Attributes | Pos Line | Neg Line |
|---|---|---|
| Line Width, µm | 219.0 | 151.0 |
| Lead Blur µm | 104.3 | 81.7 |
| Trail Blur, µm | 61.8 | 69.3 |
| Lead Rag, µm | 1.2 | 2.4 |
| Trail Rag, µm | 0.6 | 2.1 |
| Density OD | 1.1 | 0.3 |
| Fill | 0.93 | 1.00 |

# Barcode Quality Analysis

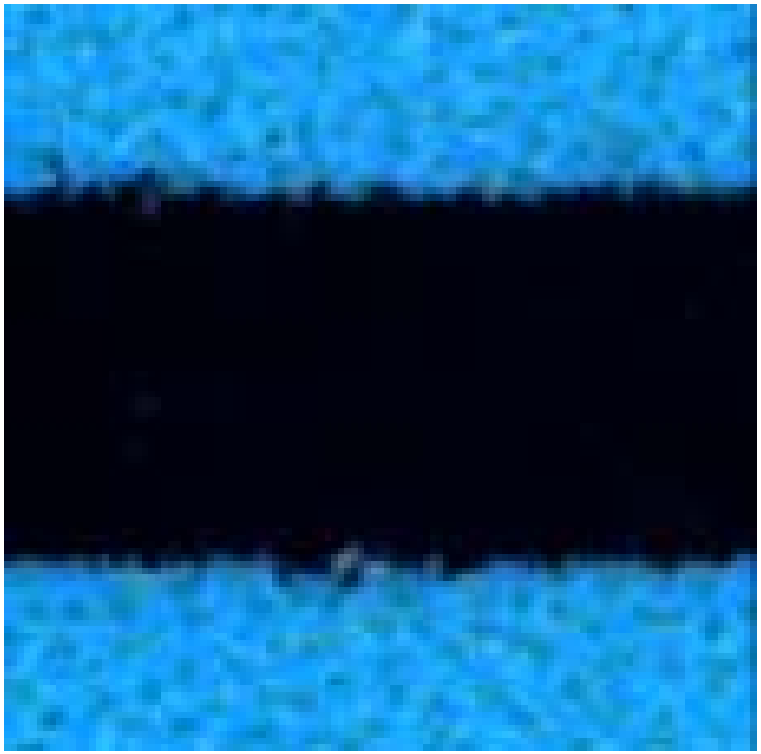



| | Line A | Line B |
|---|---|---|
| Line Width µm | 650.2 | 293.8 |
| Lead Blur µm | 11.2 | 10.8 |
| Trail Blur µm | 11.9 | 11.2 |
| Lead Rag µm | 1.4 | 1.1 |
| Trail Rag µm | 0.8 | 0.9 |
| Density OD | 1.4 | 1.4 |
| Contrast | 0.94 | 0.95 |
| Fill | 0.95 | 0.99 |

**Reflectance Profile:**

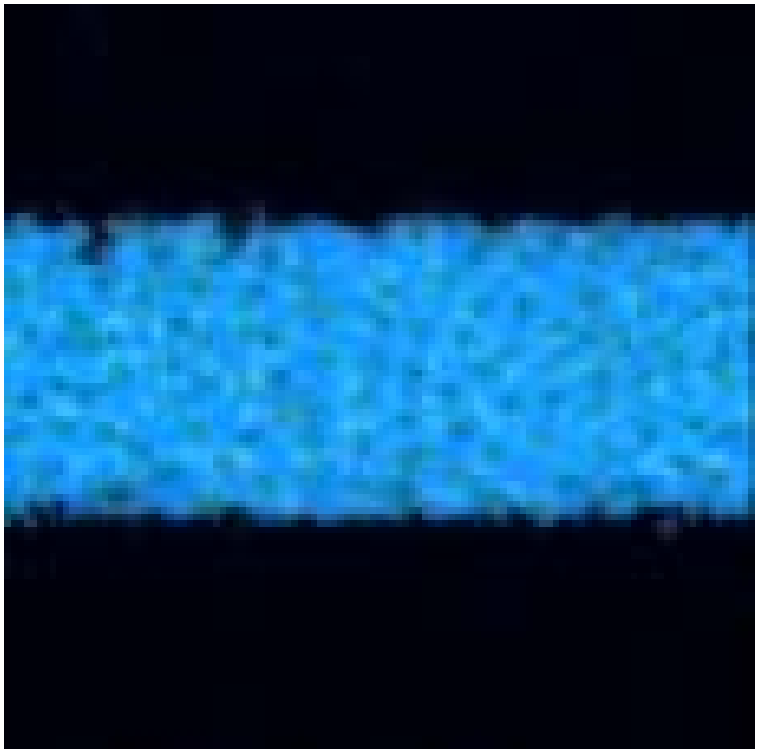


# Intercolor Bleed Measurement (or Trap Analysis)



**Black on Cyan**

**Line width = 1128.5µm**

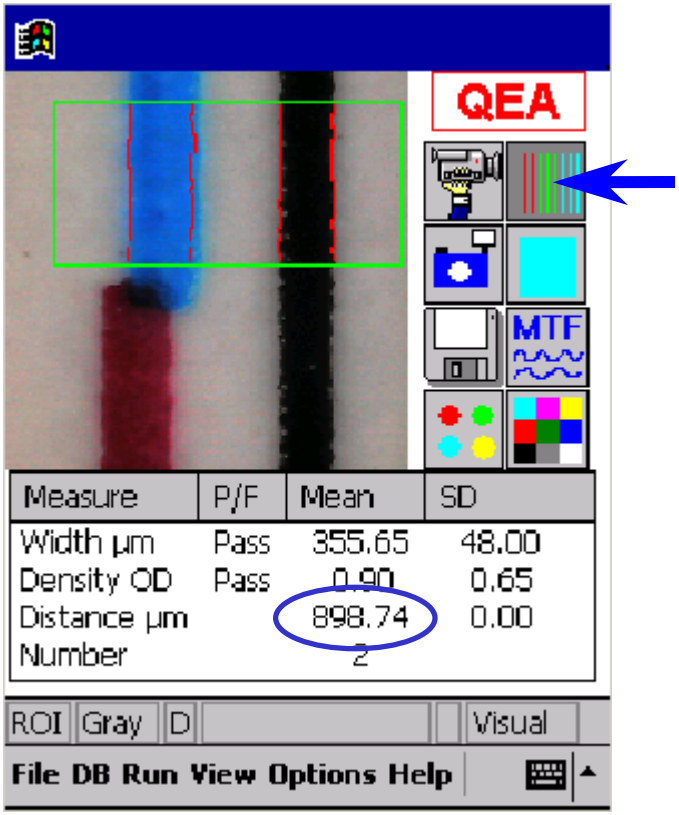


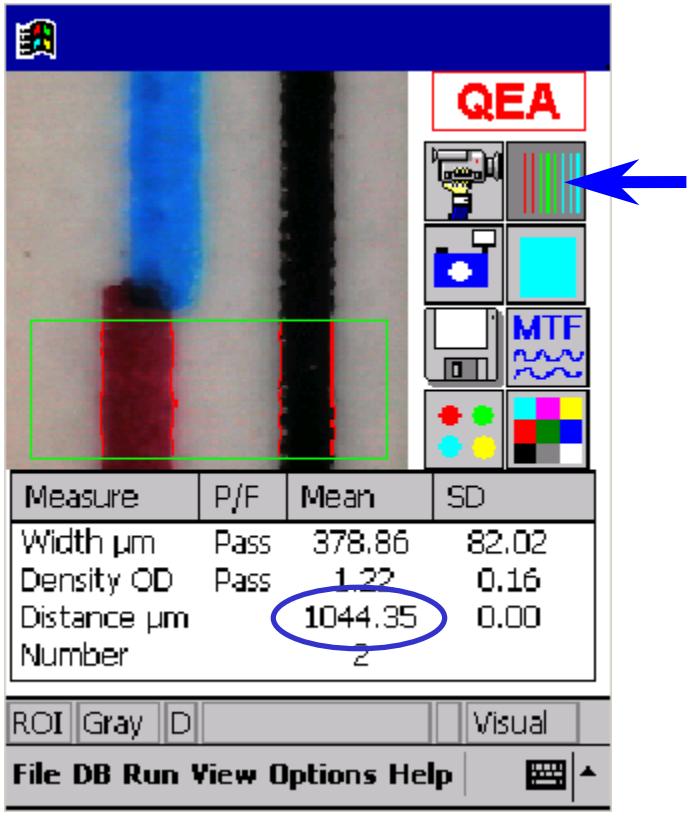
**Cyan on Black**

**Line width = 878.2µm**

**Average Intercolor Bleed = (1128.5 - 878.2) / 4 = 62.6µm**

# Color Registration Measurement

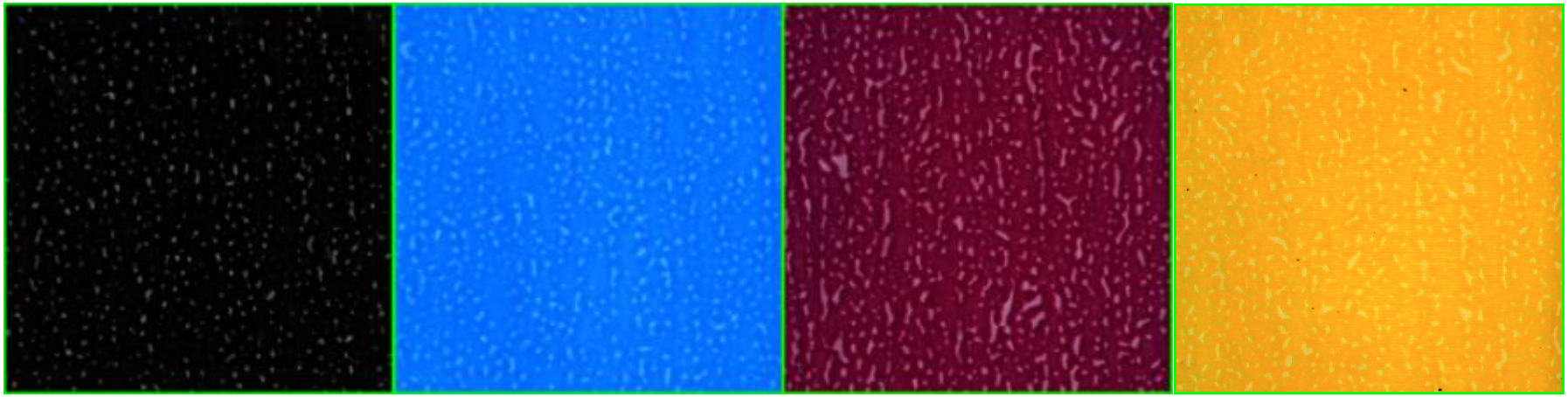



**Mis-registration = 899 - 1044 = -145µm**

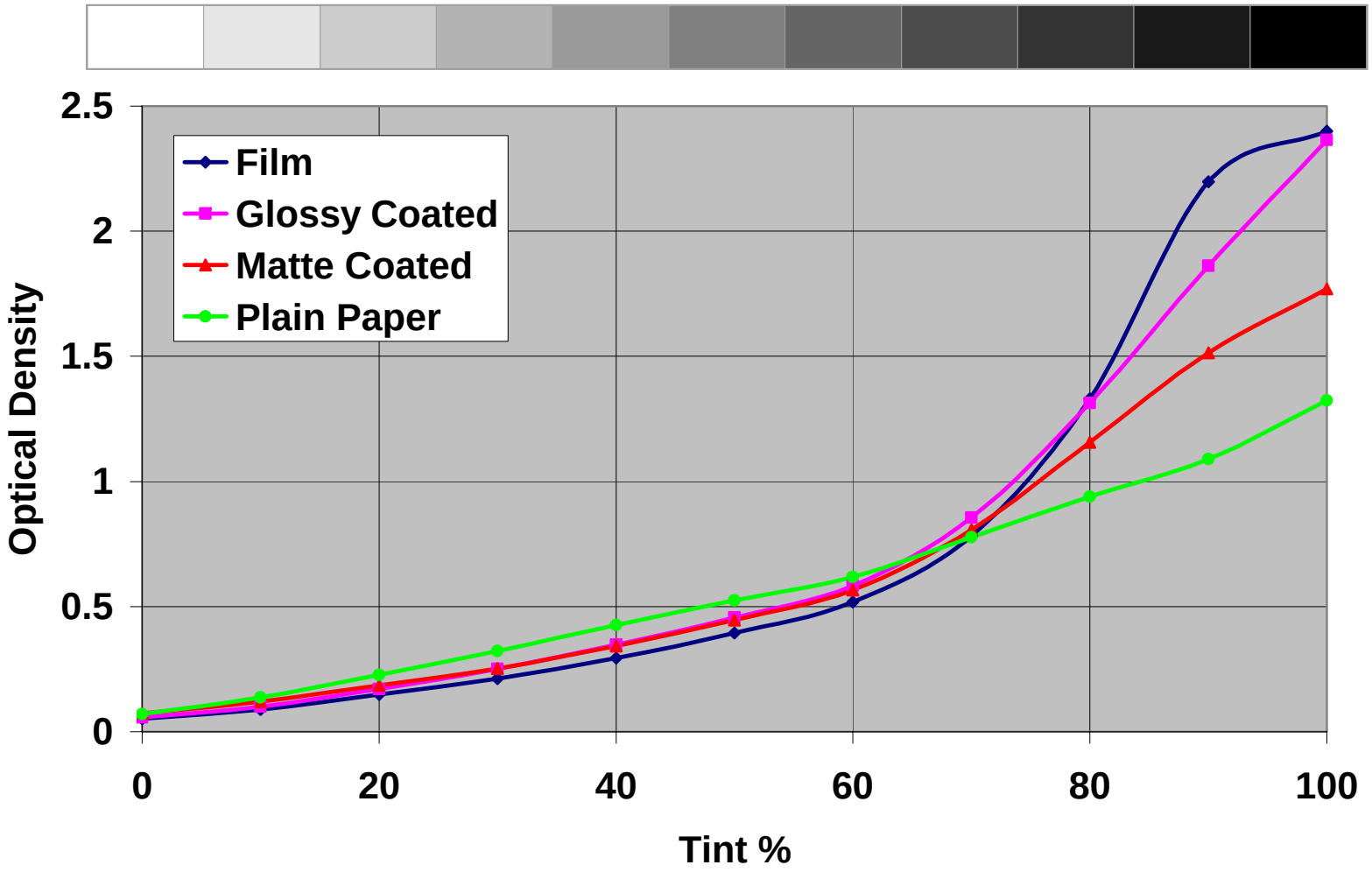
# Examples of Area Analysis

# Density & Color Measurements and Quantification of Non-Uniformity Due to Imperfect Ink Transfer

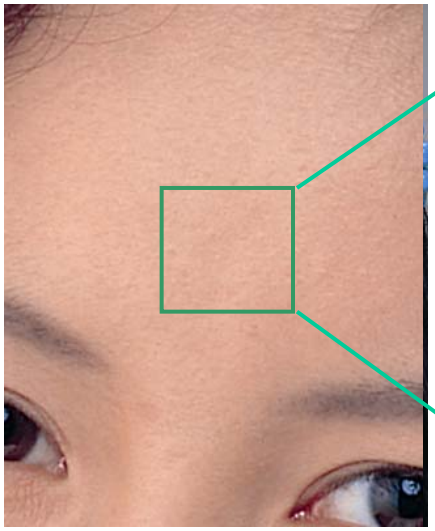


| | K | C | M | Y |
|---|---|---|---|---|
| Density | 1.66 | 1.46 | 1.35 | 0.93 |
| L* | 16.08 | 61.91 | 47.19 | 90.16 |
| a* | -0.70 | -23.48 | 54.53 | 4.73 |
| b* | -2.17 | -67.50 | -8.65 | 91.44 |
| Graininess (%) | 2.35 | 1.86 | 3.91 | 1.67 |
| Mottle (%) | 0.43 | 0.64 | 1.01 | 0.80 |

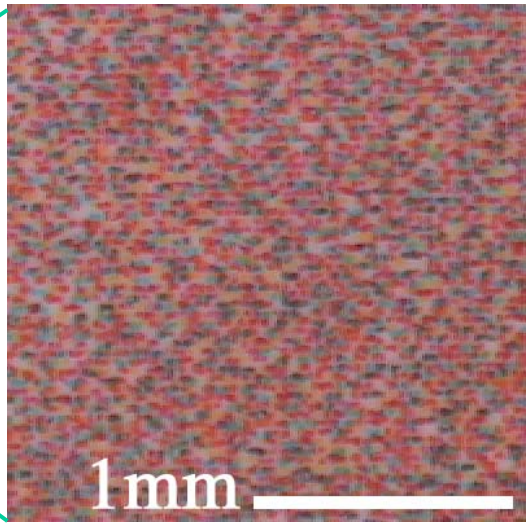
# Density & Tone Reproduction Analysis



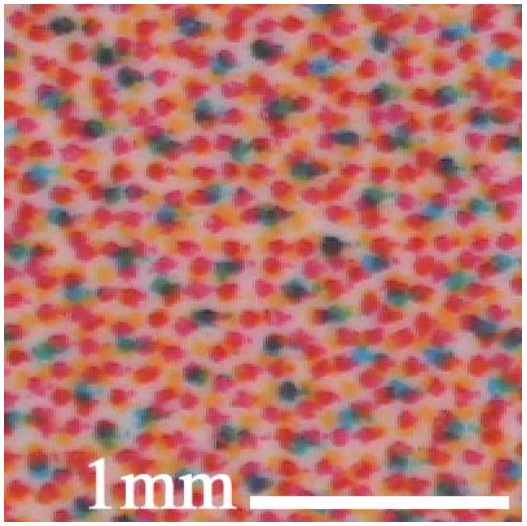
# Graininess Measurement



Printer A



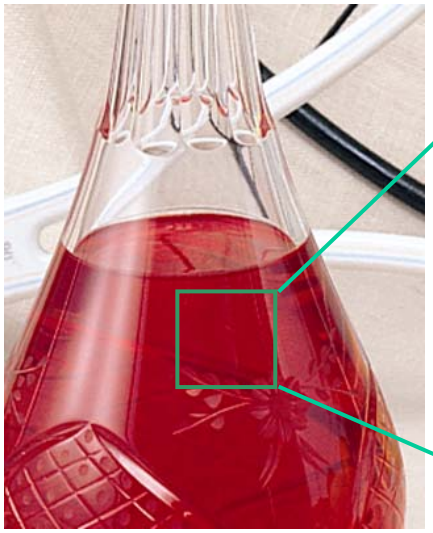

Printer B



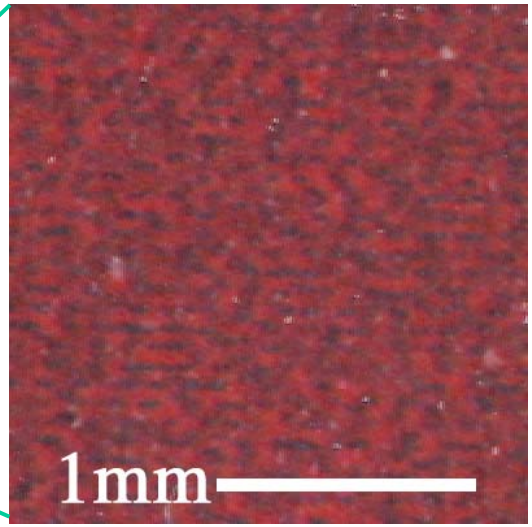

| Graininess = | 5.60 | 11.65 |
|---|---|---|

**Graininess numbers show Printer A to be much less grainy than Printer B**

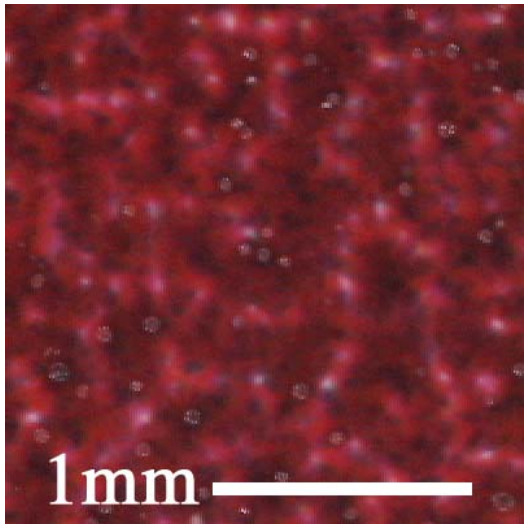
# Mottle & Coalescence Measurement



**Media A**




**Media B**




| | Media A | Media B |
|---|---|---|
| $Mottle_{250\mu m}$ = | 0.19 | 0.31 |

**Mottle values show Media A to be more uniform than Media B**

# Summary

# QEA Tools Allow You To

- **Assure Quality from Start to Finish!**
- **Improve Your Product Quality!**
- **Save Time and Reduce Waste!**
- **Keep Your Customers Happy!**

# The Right Tools for the Complete Flexo Process Flow

**Complete analysis for**

**Proofs**

**Films**

**Plates**

**Prints**

**For more information, contact:**

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