This Job Looks Terrible !!!

It MUST be the Plates……

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Flexo Printing is a Simple Process

- There are only a few components in the mechanics of ink transfer
  - Ink
  - Anilox Roll
  - Metering Device
  - Plate
  - Substrate

Mechanics of Ink Transfer

- BUT….. It's the interactions, or lack thereof between them….That can drive you CRAZY!!!
- A BASIC understanding of the components and how they interact, or don't interact, can help solve printing issues more quickly

- Troubleshooting Flexo isn't always knowing exactly what the problem **IS**…. It's done by systematically eliminating what it **ISN'T !!**

Common Printing Complaints About Plates

- Color/Coverage
  - Too Light
  - Too Dark
  - Non Uniform Color in Solids

- Dirty Print/Screens
- Dot Gain

Common Printing Complaints About Inks

- Color/Coverage
  - Too Light
  - Too Dark
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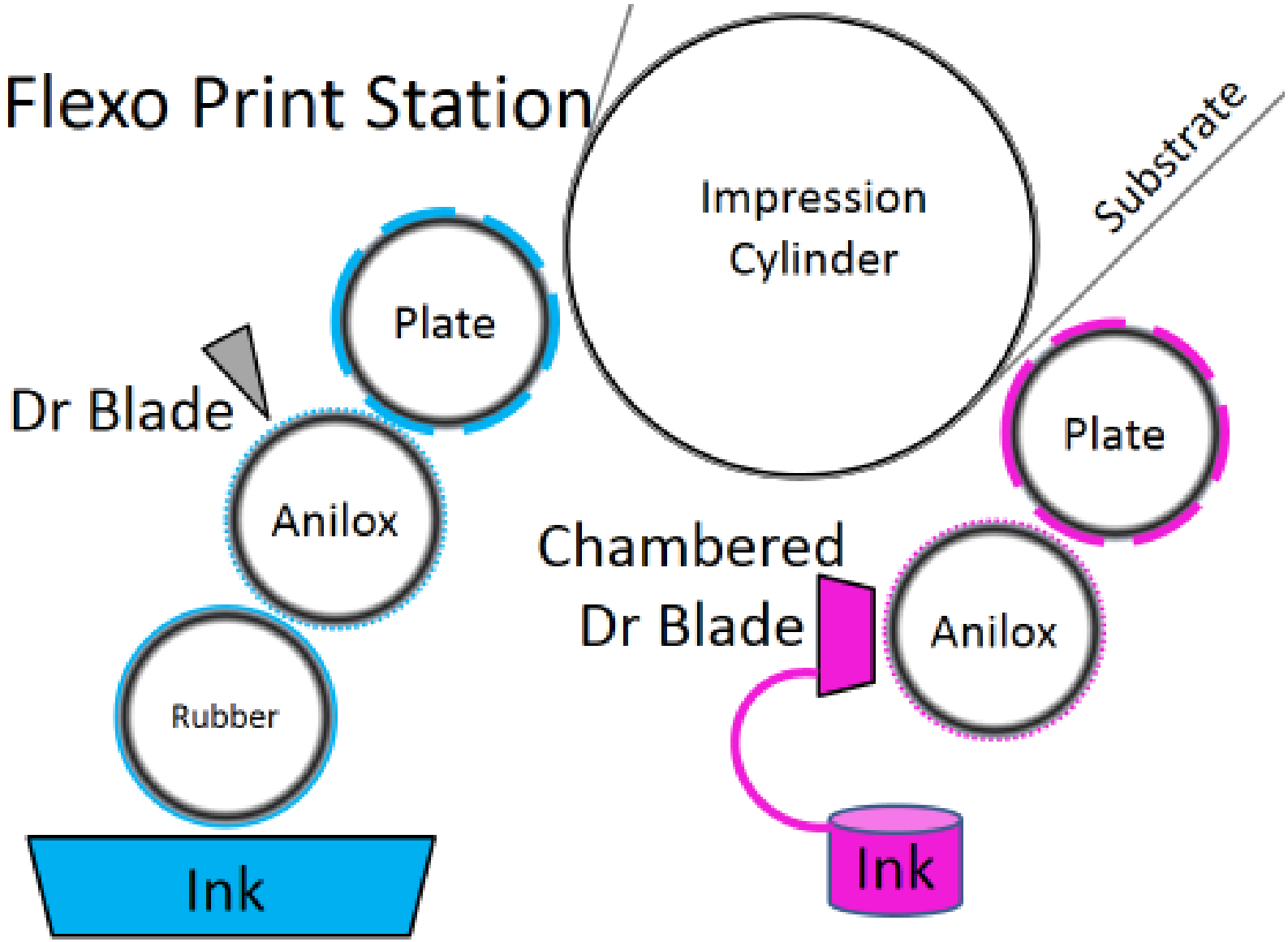
Common Printing Complaints About Anilox Rolls

- Color/Coverage
  - Too Light
  - Too Dark
  - Non Uniform Color in Solids
- Dirty Print/Screens
- Dot Gain

Color and Coverage

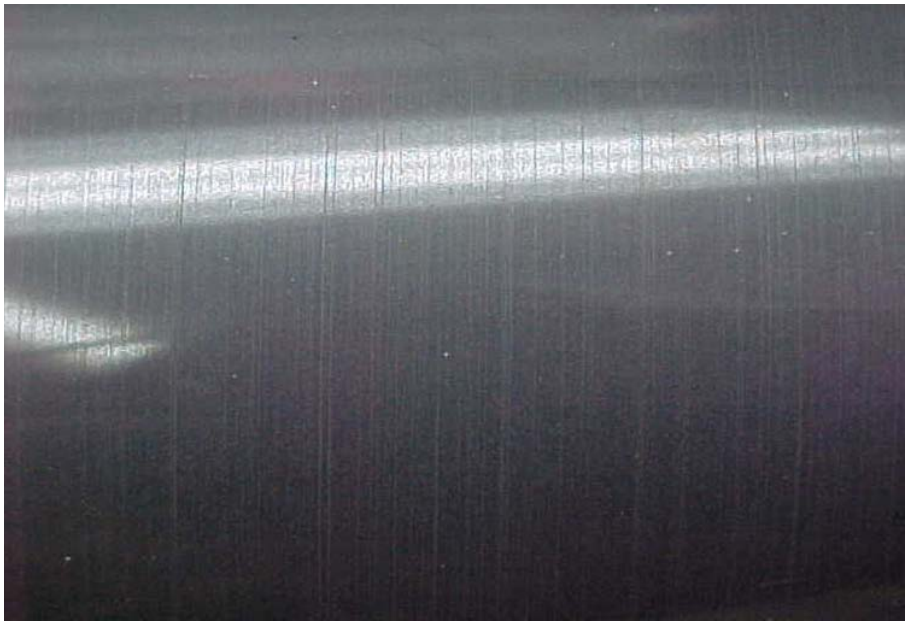
- Dictated by the VOLUME of the Anilox Roll
  - Ink Film Thickness
- INFLUENCED by the Metering System
  - 2-Roll
  - Doctor Blade
- INFLUENCED by the Ink
  - Viscosity
  - Dry Rate
- A plate, suitable for the application, ***properly produced*** … has NO INFLUENCE on Color and Coverage

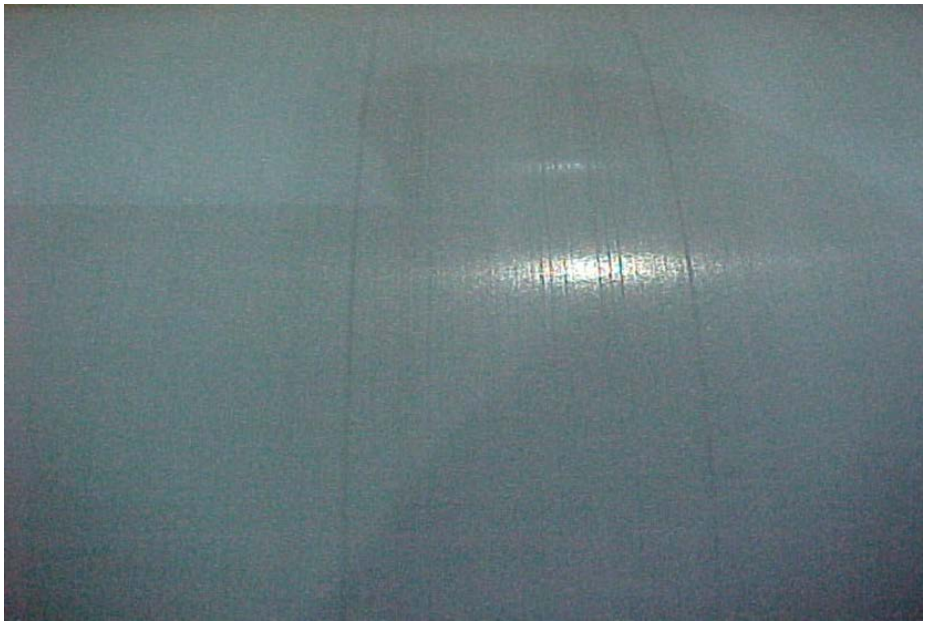
Mechanics of Ink Transfer



The Anilox Roll

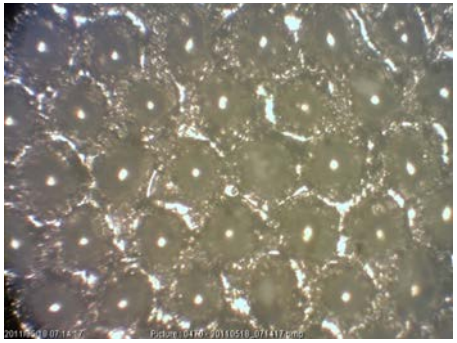
- This is what YOU see

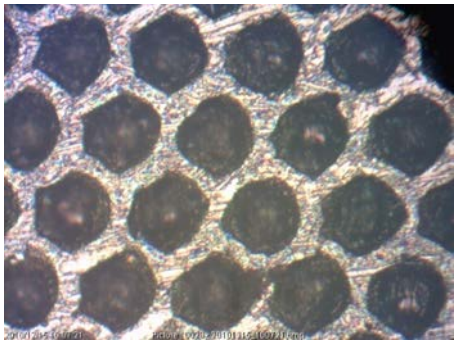


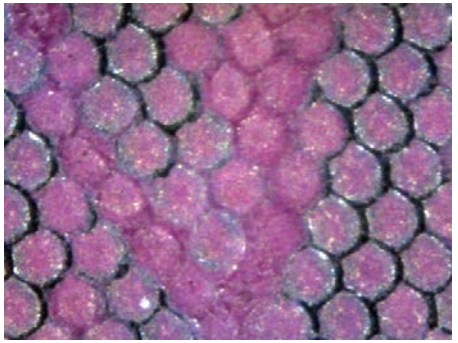


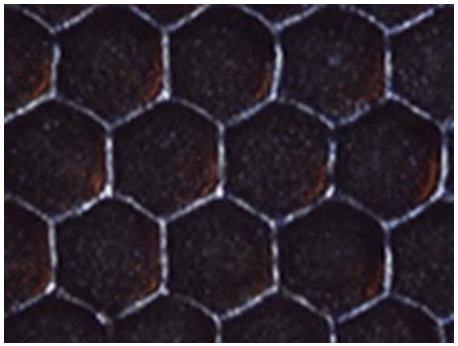
The Anilox Roll

- This is what I see



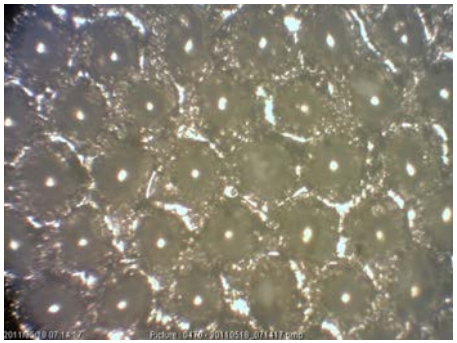


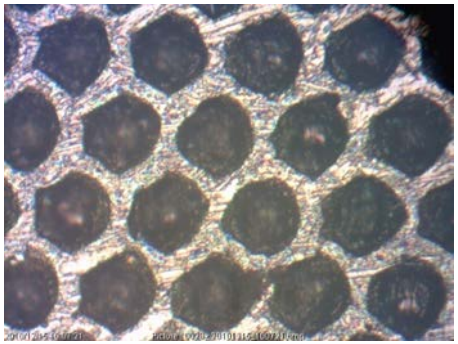


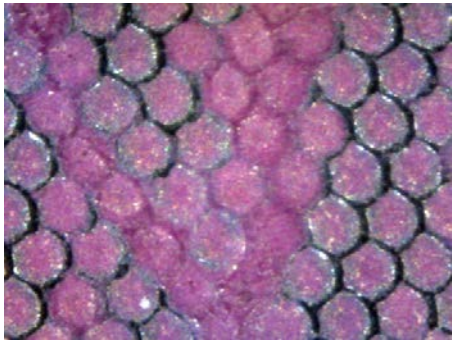


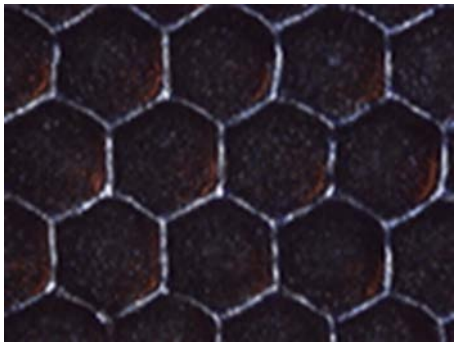
The Anilox Roll

- All of these will work in a 2-Roll System
- Only 1 will with a Doctor Blade



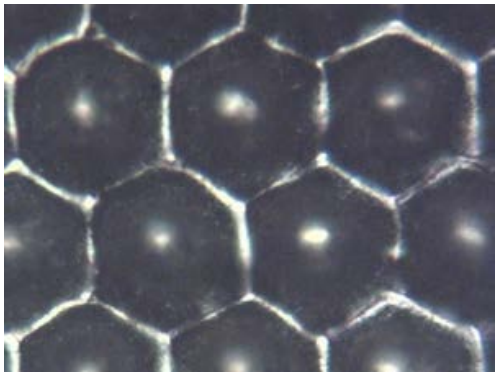


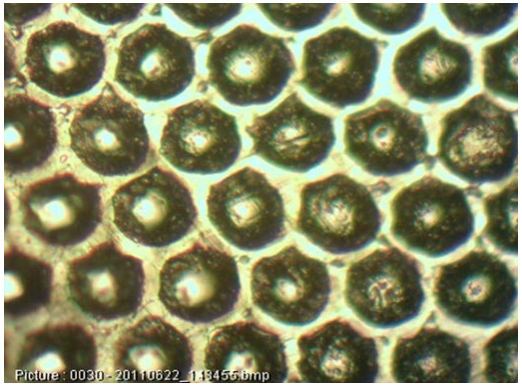


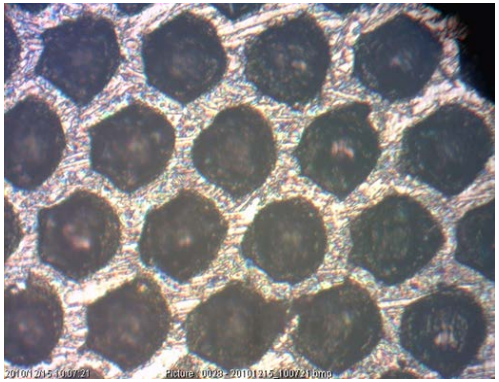


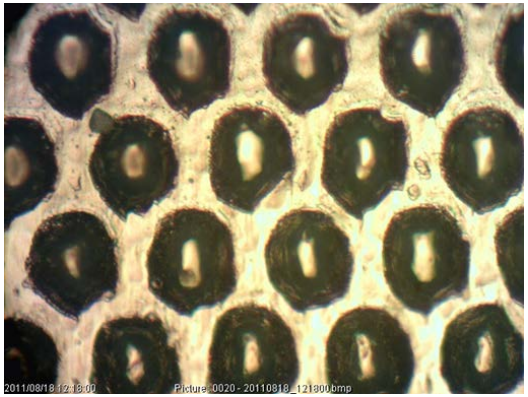
Doctor Blade Metering

- Wear changes the Volume, IFT, and Uniformity of Laydown

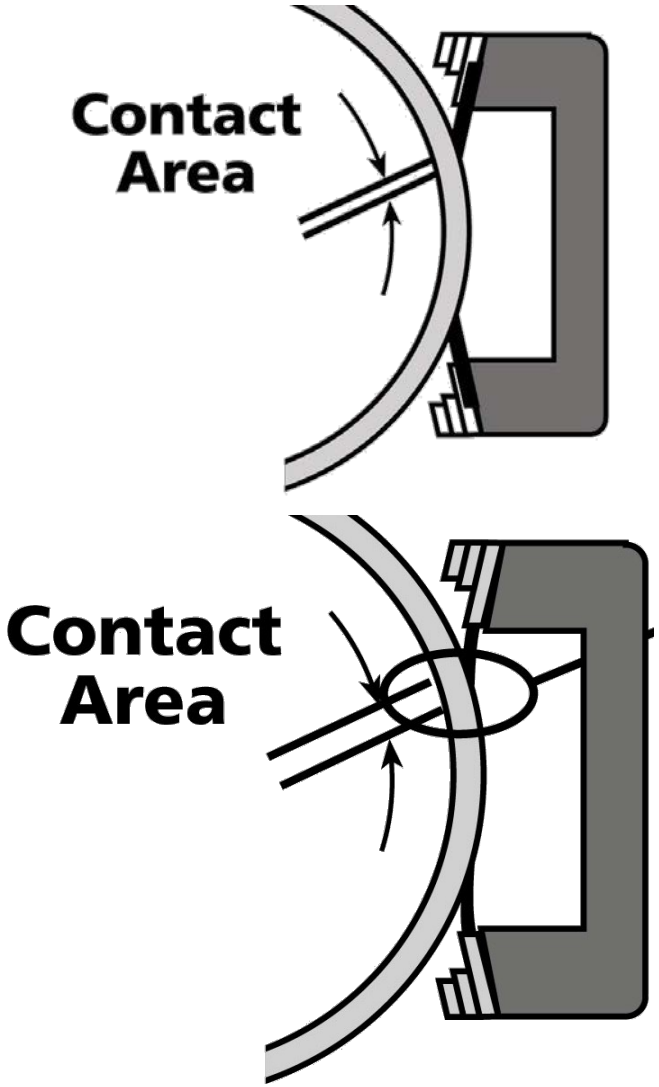


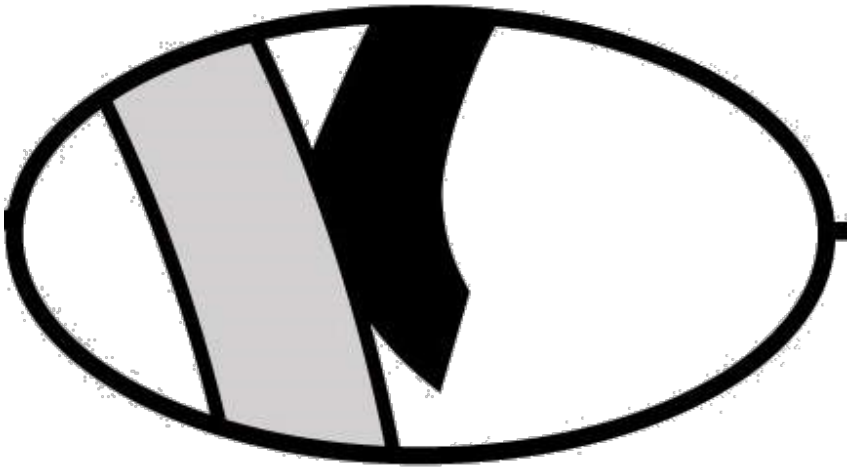






Pressman's Trick to Make a Worn Roll Work





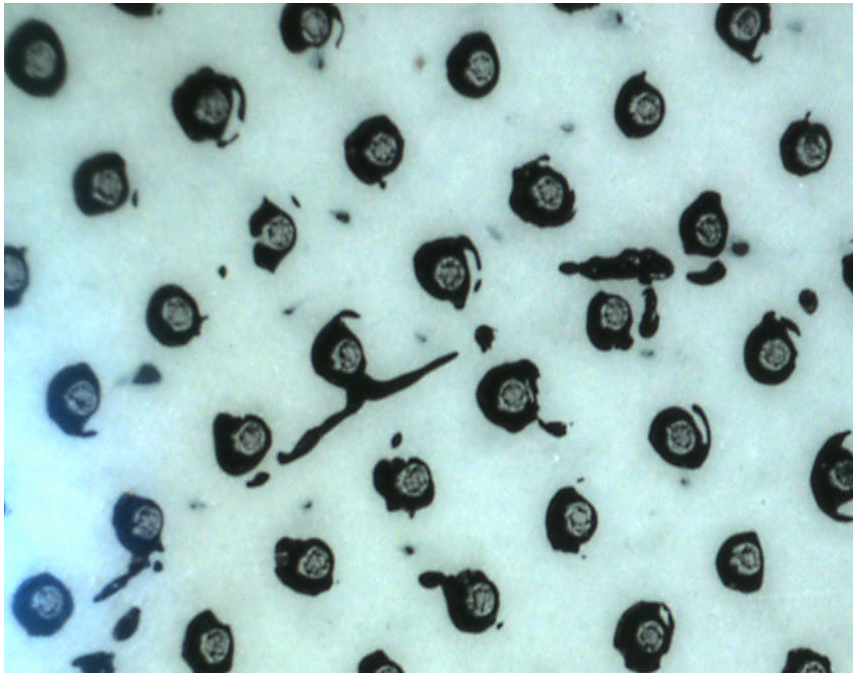
Dirty Print/Dirty Screens

- Plates DON'T Print Dirty !!!!
  - How can a raised image medium deposit ink where there is NO raised image area????
- Inks can cause it
  - Poor Viscosity Control
  - Dry Rate incorrect
- Anilox Rolls can cause it too

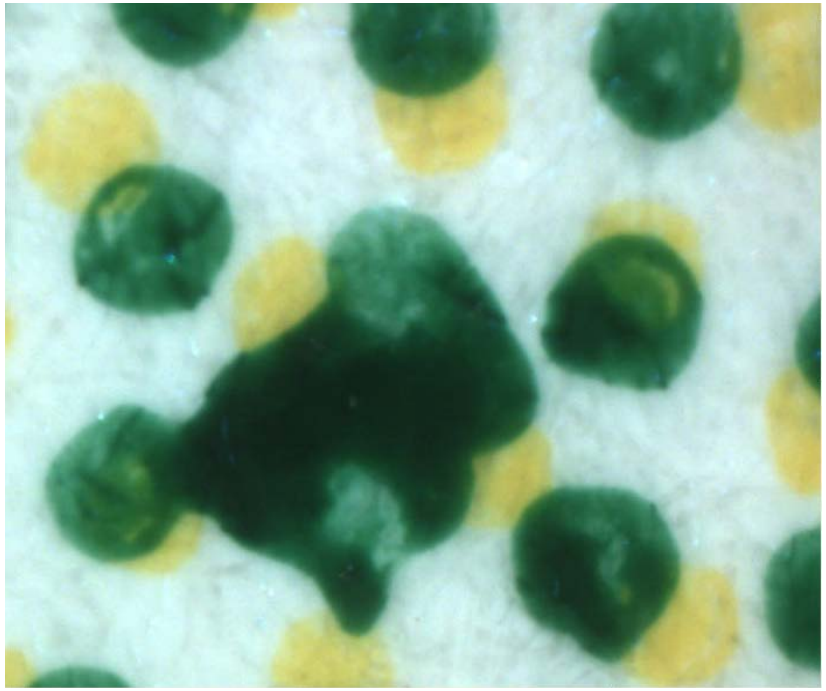
  Only if incorrectly specified for Volume and/or Cell Count
- Inking Impression setting has a big influence

Dirty Print/Dirty Screens

Viscosity Too High

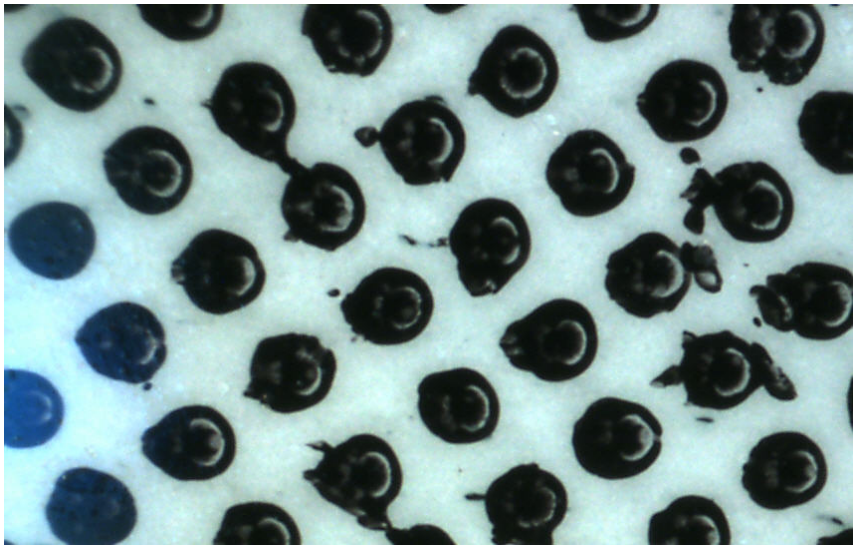


Too Much Volume

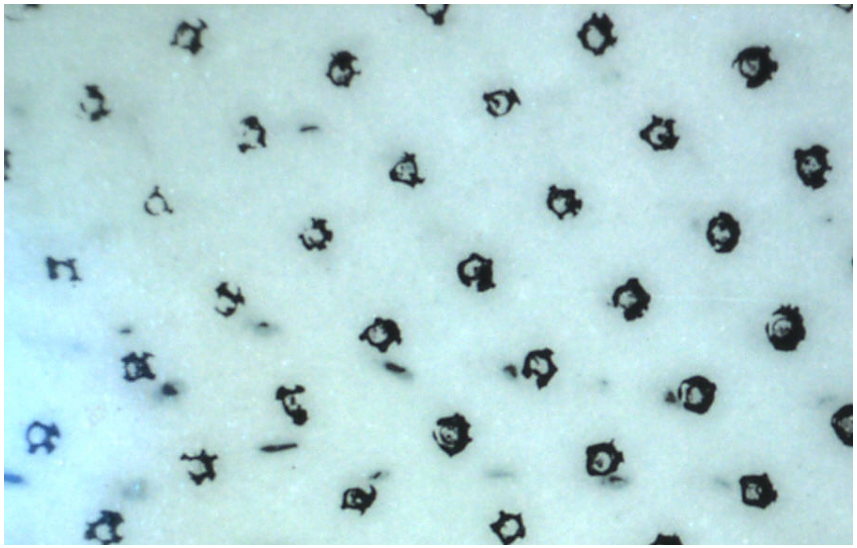


Dirty Print/Dirty Screens

Heavy Inking Impression



Incorrect Dry Rate

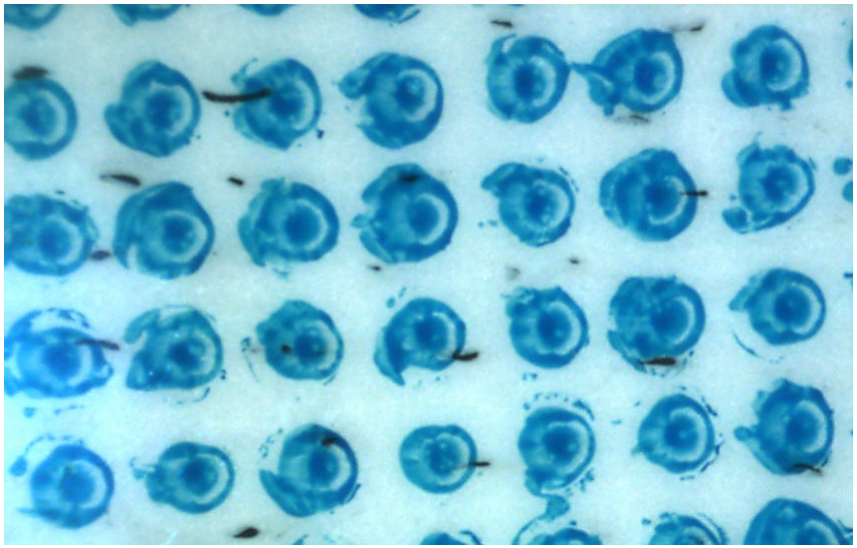


Dot Gain

- The Plate(s) could be a cause but unlikely
  - IF wrong DGC applied
- Inks can be a cause but unlikely
  - Low viscosity/High Spread would create light color/low density
- Anilox Roll could also be a factor but also unlikely
  - IF wrong Volume specified

Dot Gain

Excessive Inking Impression



A Plate Issue???

- No, not the Plate
- Not the Ink
- Not the Anilox Roll

- Virtually ALL Dot Gain issues are Operator induced!!!

Understanding What's What

- Defending our products when problems arise is much easier when we know what questions to ask and how the inter-related products react or don't react with one another

Aniloxes to the Rescue

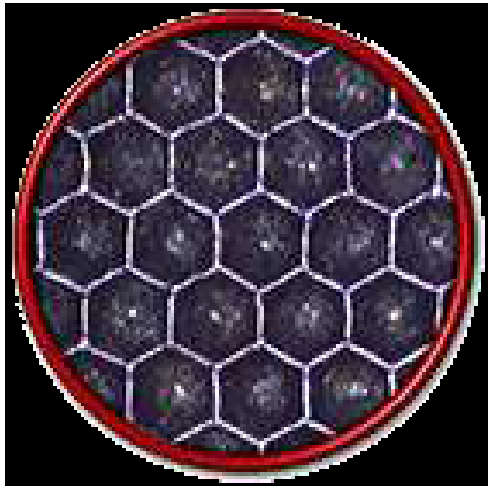
- Well sort of….
- Other engraving technology that can help minimize or eliminate the issues we have ALL been accused of causing

- But first, a look at where we are now

60° Hex Engraving

Standard 60° H Engraving

Single Laser Pulse Cell Formation



At the time was the best technology available

- Most Widely Used Pattern
- Works Well In Most All Flexo Applications
- **BUT…..** Only If It's Specified W/In 23% to 33% Depth to Opening Ratio

Proper Depth to Opening Ratio 23%-33%

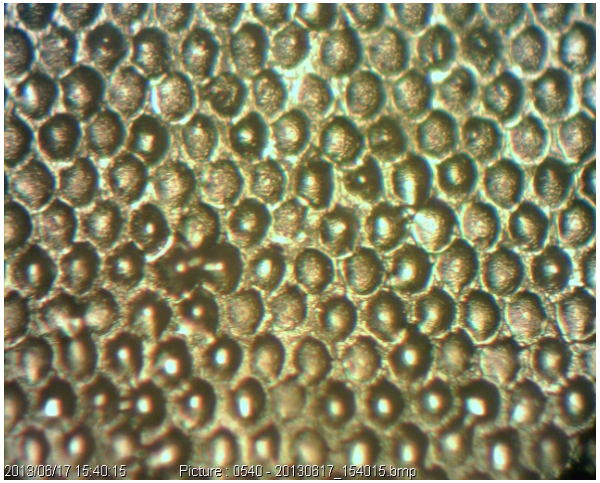
- Within That Ratio…..
  - Good Geometric Cell Quality Is Achieved
  - Parabolic Cavity Shape For Good Ink Transfer
    - Volume Can Be Verified Through Microscope and Mathematical Calculation or Advanced Measurement Technology
- Both Required For Good Print Quality

Proper Depth to Opening Ratio

23%-33%

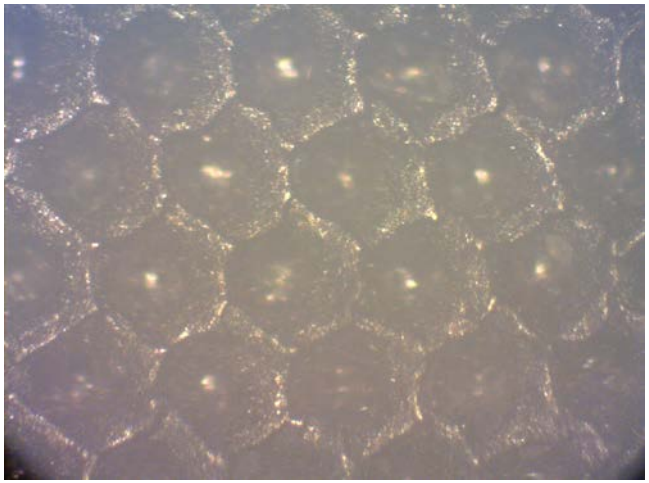
IF Too Shallow <23%

- 1000 L/S- 1.0 BCM @ 18%
- Poor Cell Structure
- Cavity Shape Doesn't Fit Mathematical Formula



If Too Deep >33%

- 250 L/S- 8.6 BCM @ 35%
- Poor Cell Structure
- Cavity Shape Doesn't Fit Mathematical Formula



Cell Volume is Constrained by the Cell Count

Extended Hexagon

550 – 2.0 BCM @ 19%

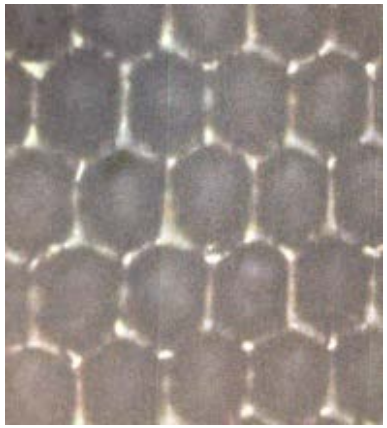
Volume Verified Through Interferometry

No Loss of Geometric Cell Quality

800 – 4.0 BCM @ 50%

Volume Verified Through Interferometry

No Loss of Geometric Cell Quality

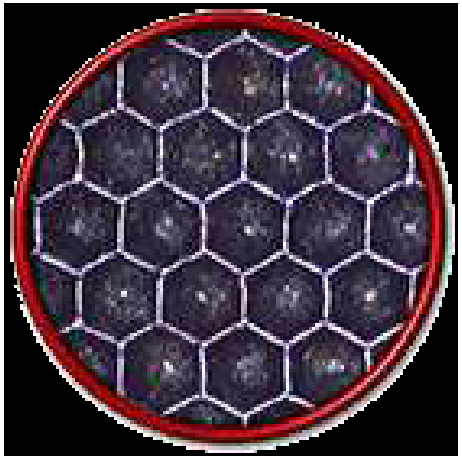


Cell Volume is NOT Constrained by the Cell Count

Volume Constraint

Standard 60^{o} Hex

- 360 Cell Count
  - 3.9 to 5.0 BCM



Extended Hex

- 360 Cell Count
  - 4.8 to 7.2 BCM

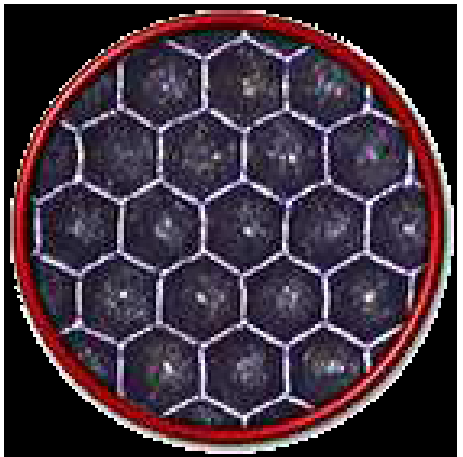
How Does This Help?

Extended Hex

- Removal of interior cell walls adds volume capacity
- Much more surface ink available to the plate- Better transfer, laydown and coverage
- Shallower engraving is MUCH easier to clean H20 based and higher viscosity curable inks
- Better Opacity with Opaque Whites

Standard 60^{o} Hex

- Less surface ink to the plate
- More sensitive to viscosity drift
- Can be more difficult to clean if spec'd to the higher side of D/O ratio.



Extended Hexagon

Coverage w/ 60^{o} Hex

550 – 3.0 BCM

Coverage w/ Extended Hex

550 – 3.0 BCM

How Does This Help?

- Good for Combination Printing
  - Higher volumes needed for Spot Color strength can be had at higher cell counts to help keep screens clean
  - Caveat is use should be limited to H20 and Solvent Inks.
    - More diligence needed in keeping rolls clean because the cells are deeper

Summary

- All of the major components in the print train are inter-related
- Understanding their reactions or lack thereof is important in quickly solving press side issues
- Eliminate what the problem ISN’T first
- There is other anilox roll engraving technology available besides the 60^{o} Hex