



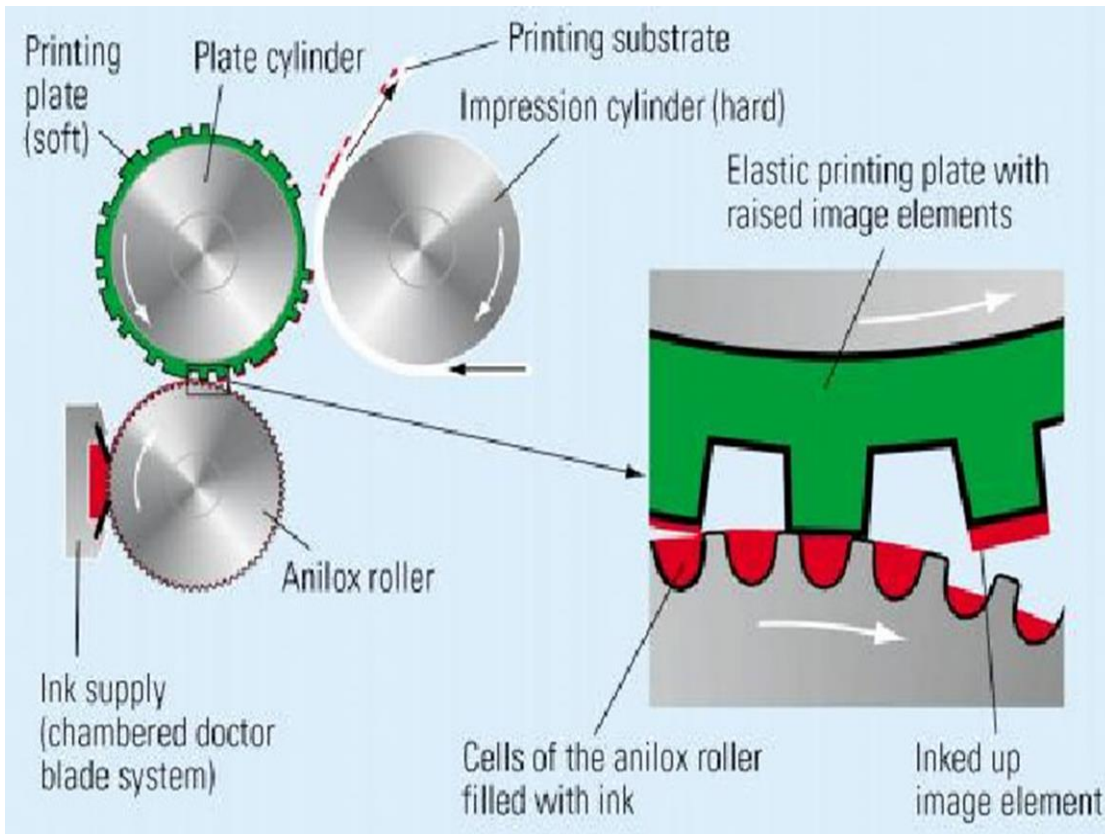
Anilox Selection & Management

Heart of the Flexographic Print Process

John Bingham

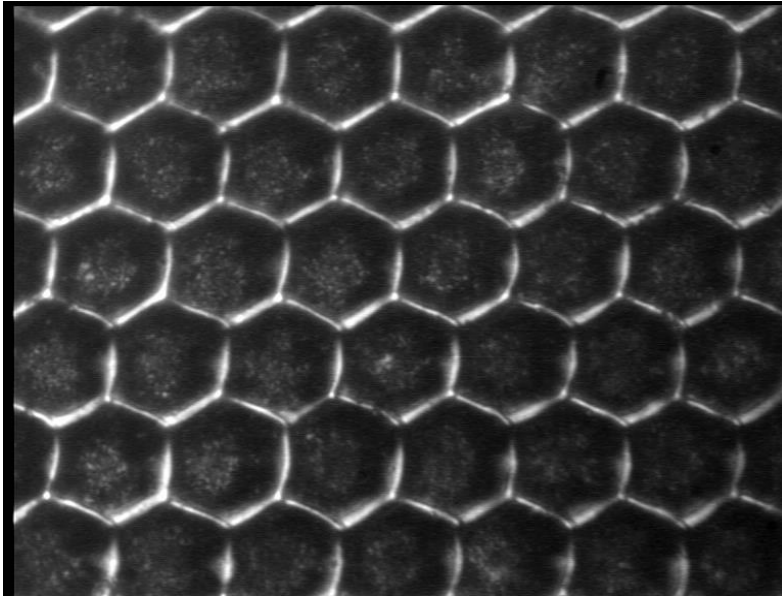
Bingham Flexo Services

Components/Variables Of The Flexographic Process

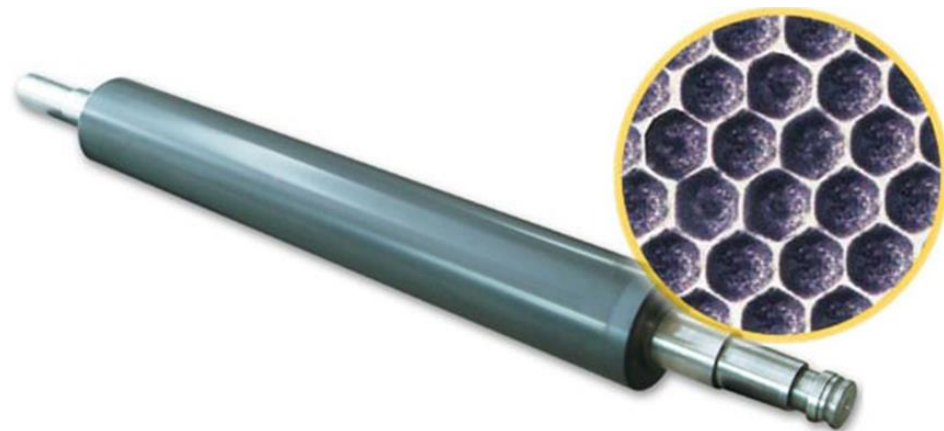


- Anilox
- Doctor Blade
- Ink
- Plates
- Sticky-back
- Substrate
- Impression
- Press Operator

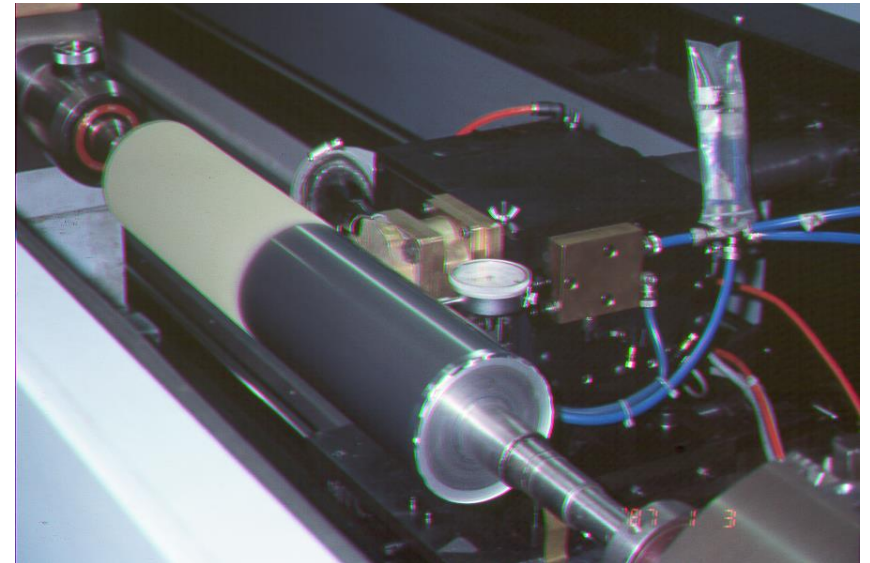
The Anilox Roll Is The Heart Of The Press



The Anilox Cell Volume Determines
The Ink Film Thickness Transferred
To The Printed Substrate



Anilox Manufacturing Process



Anilox Roll Selection

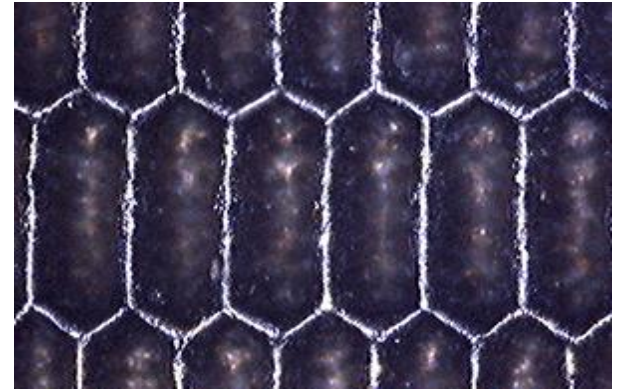
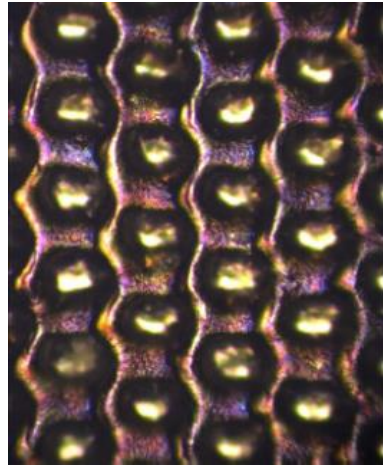
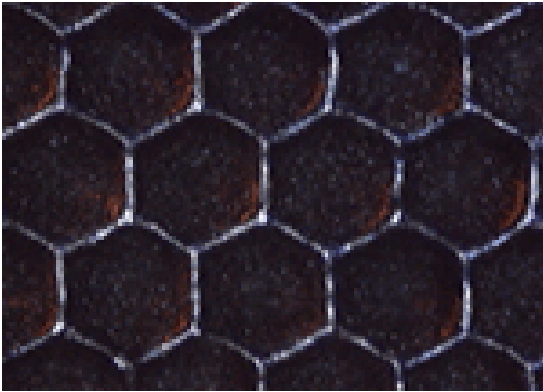
- Graphics
- Substrate Porosity
- Ink System
- Cleaning Program

- Cell Volume (BCM)
- Cell Geometry
- Depth To Opening
- Line Screen

Anilox Roll Volume - Most Critical

- ▶ Volume is the amount of ink per square inch on the surface of the anilox roll
- ▶ Volume is measured in BCM - billion cubic microns
- ▶ Volume dictates Ink Film Thickness
- ▶ Solids – 5 to 9 BCM
- ▶ Type – 3 to 6 BCM
- ▶ Half-tones – 1 to 4 BCM
- ▶ Combination plates/vignettes require a compromise

Cell Geometry



60 Degree Angle – Six sided cells formed by walls that are equal in length. The cell structure is circular with cup shaped bottoms

30 Degree Channel – A compressed six-sided cell with a vertical channel used to apply white ink and reduce misting/spitting

Eflo 75 Degree Angle Cells – Six sided cells formed by two vertical cell walls that are longer than the horizontal cell walls. The cell structure is elongated with flat, elongated bottoms

Depth To Opening Ratio < 40%

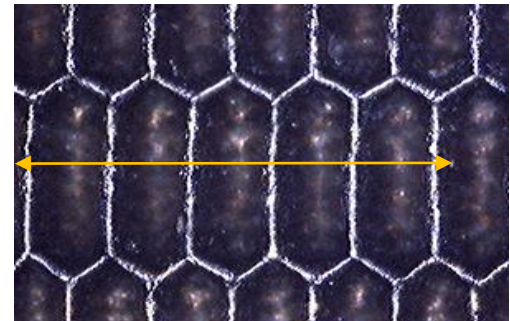
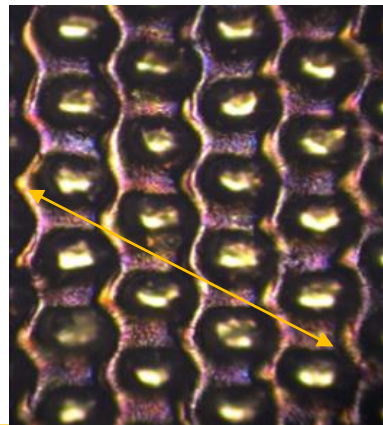
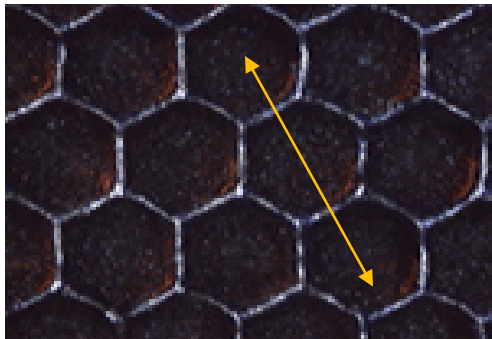
Excess D/O Ratio Causes

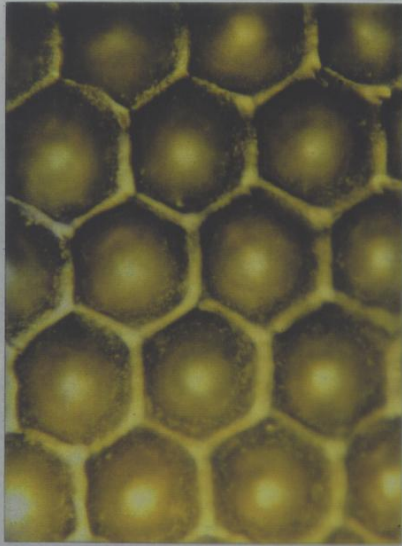
- Premature Wear
- Poor Ink Transfer
- Plugging
- Ghosting



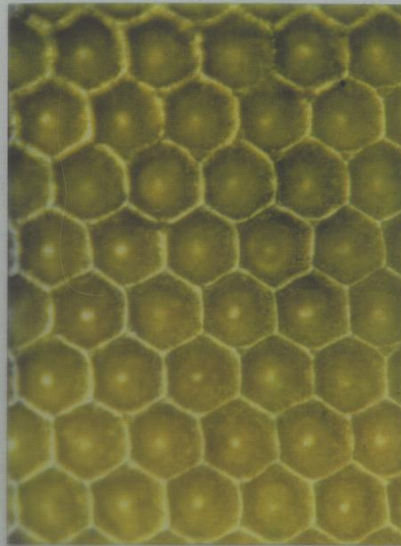
Line Screen – Secondary To Volume

- The Number Of Cells Per Linear Inch
- 60 and 30 Degree - Number of cells per linear inch at a 60 or 30 degree angle around the anilox roll
- 75 degree – Number of cells per linear inch horizontally across the anilox roll. The vertical line screen is 50% of horizontal
- The Cells Per Square Inch Is Determined By Multiplying The Horizontal Line Screen By The Vertical Line Screen





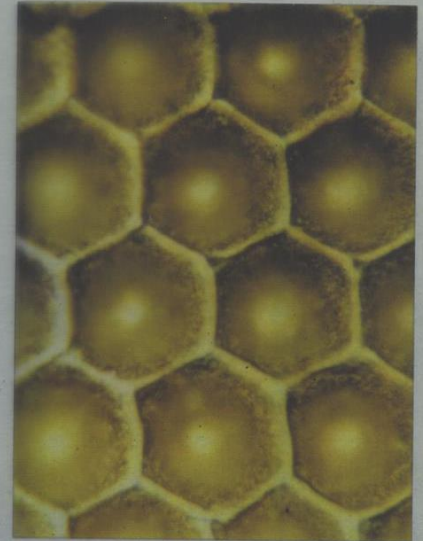
400 lpi / 160 lpcm



600 lpi / 235 lpcm



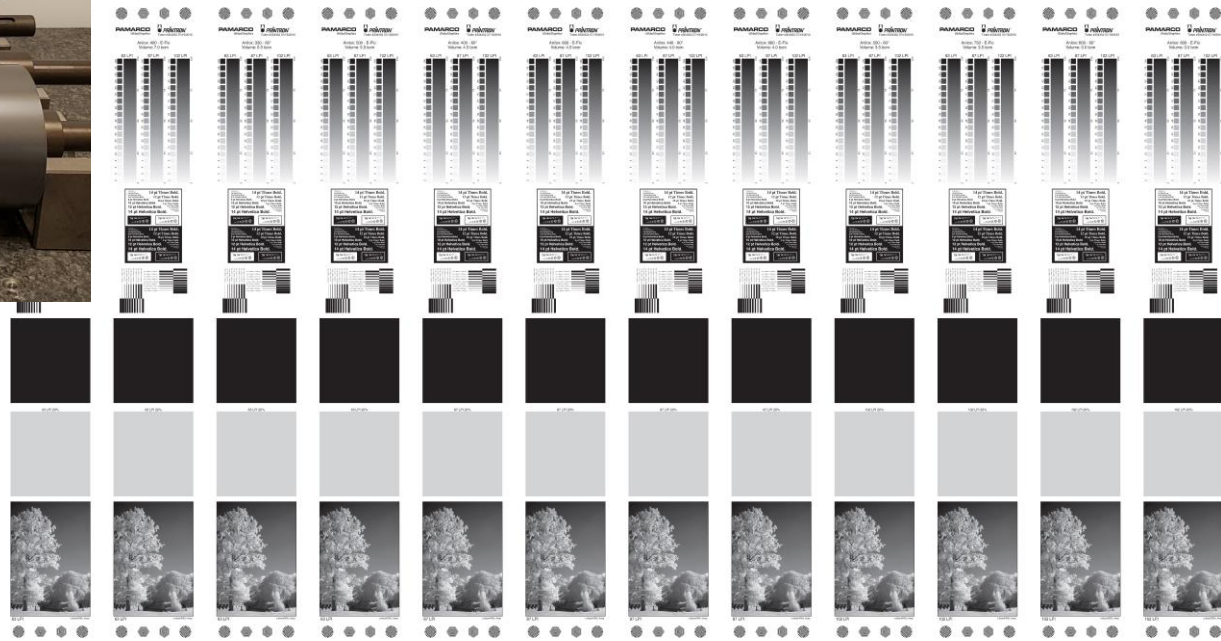
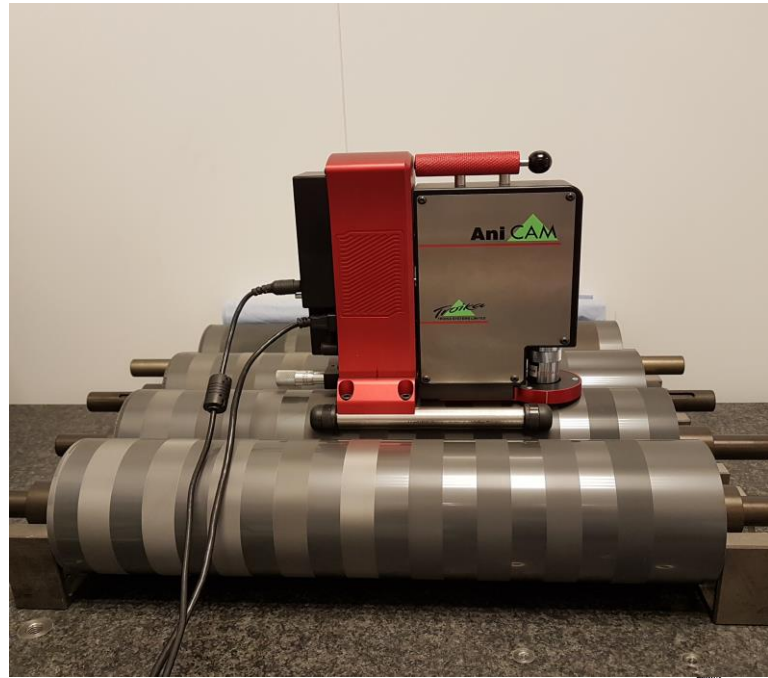
200 lpi / 80 lpcm



360 lpi / 140 lpcm

Banded Anilox Testing

Banded Anilox Testing Is An Excellent Way To Test Multiple Engravings To Determine The Best Engravings For Your Application



Anilox Wear Test – Banded Roll

- Pamarco Engraved An Anilox Roll At The Specification Of 550 LPI, 5.5 BCM
- 5 Bands Were Polished To Reduced Volumes To Simulate Doctor Blade Wear
 - 5.5 BCM – 100% of Original Volume
 - 4.95 BCM – 88% of Original Volume
 - 4.4 BCM – 81% of Original Volume
 - 3.85 BCM – 72% of Original Volume
 - 3.3 BCM – 63% of Original Volume
 - 2.75 BCM – 55% of Original Volume

Anilox Wear Test

The Following 6 Colors Were Printed

1. Reflex Blue
2. PMS 2602 Purple
3. PMS 146 Brown
4. PMS 207 Red
5. PMS 3295 Green
6. Opaque White

Standard 13226 3295 Green

98%
 ΔL -0.07
 Δa -3.91
 Δb 0.62
 ΔC 3.85
 Δh -1.07
 ΔE_{2000} 1.32



88%
 ΔL 1.50
 Δa -3.33
 Δb 0.31
 ΔC 3.30
 Δh -0.68
 ΔE_{2000} 1.73



81%
 ΔL 3.55
 Δa -2.14
 Δb 0.00
 ΔC 2.13
 Δh -0.22
 ΔE_{2000} 3.31



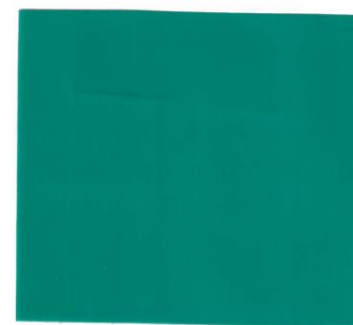
72%
 ΔL 4.80
 Δa -1.41
 Δb -0.09
 ΔC 1.41
 Δh -0.05
 ΔE_{2000} 4.44



63%
 ΔL 6.09
 Δa -0.74
 Δb -0.10
 ΔC 0.74
 Δh 0.04
 ΔE_{2000} 5.67



55%
 ΔL 7.14
 Δa -0.16
 Δb -0.19
 ΔC 0.18
 Δh 0.20
 ΔE_{2000} 6.70



Anilox Wear Test – Delta E

- 5.5 BCM (100%) – 1.26 Δ
- 4.85 BCM (88%) – 1.23 Δ
- 4.4 BCM (81%) – 2.71 Δ
- 3.85 BCM (72%) – 2.83 Δ
- 3.3 BCM (63%) – 4.70 Δ
- 2.75 BCM (55%) – 6.01 Δ

On Average 15% Wear = Delta Δ Above 2.0

Anilox Wear Test – White Opacity

- 5.5 BCM (100%) – 48.4
- 4.85 BCM (88%) – 48.0
- 4.4 BCM (81%) – 46.5
- 3.85 BCM (72%) – 46.9
- 3.3 BCM (63%) – 45.0
- 2.75 BCM (55%) – 44.0

What Is The Cost Of The Wrong Anilox?

- How Often Is The Press Down Due To Color Matching/Ink Strengthening/Score Lines?
- What Is Press Time Worth?
- If Press-time Is Worth \$500 Per Hour
 - 3 Ink Adjustments Per Job
 - 30 Minutes Per Adjustment
 - 50 Jobs Per Month

\$450,000 Of Downtime Per Press Per Year!

Anilox Management Easily Pays For Itself



Anilox Roll Audits

TECHNICAL SERVICE REPORT



Date: 04/03/2020 CUSTOMER:

LAB REF#: GP-KOH-K1:02		Additional comments	
BACKGROUND INFORMATION			
Date Received: 2/11/2020	Roll Supplier: Pamarco	Press:	
Sales Rep: Shane Weber	Print Station:		
Roll Serial No: SR000000	Metering:		
Date Installed: 1/2020	Machine No:		
Orig'l Cell Volume: 6			
MICRO-FAX ROLL ANALYSIS (at the time of the audit)			
Cell Volume (BCM): 5.93	Depth/Opening Ratio: 37%		
Cell Depth (µm): 24.43	Wall/Opening Ratio: 7%		
Cell Opening (µm): 66.1			
Wall Thickness (µm): 4.5			
Screen: 350L/in Angle: 60			
CONCLUSION			
Effective Cell Volume = 98.8%			
* Loss in cell volume is the result of wear, dirty cells or both			
** % Effective Cell Volume = Present Cell Volume / Original Cell Volume x 100			
OBSERVATIONS			
Plugging: None	<input checked="" type="checkbox"/> Cells are in good condition	<input type="checkbox"/> Broken cell walls	
Wear: None	<input type="checkbox"/> Wide cell walls	<input type="checkbox"/> Poor cell geometry	
	<input type="checkbox"/> Channeling between cells	<input type="checkbox"/> Low volume	
	<input type="checkbox"/> Cell wall damage		
RECOMMENDED ACTIONS			
<input checked="" type="checkbox"/> Continue Use	<input type="checkbox"/> Re-engage	<input type="checkbox"/> May need re-engage soon	
	<input type="checkbox"/> Monitor print quality	<input type="checkbox"/> Clean & monitor print quality	
Recommendation made by Tabatha McDonald	Approved by Shane Weber		

REPORT



Additional comments		
099550, 100454		
Field Comment: Cleaned in press. May have plugging.		
F&K		
Depth/Opening Ratio: 37%	Wall/Opening Ratio: 11%	
Screen: 500L/in Angle: 60		
Effective Cell Volume = 64.4%		
* Loss in cell volume is the result of wear, dirty cells or both		
** % Effective Cell Volume = Present Cell Volume / Original Cell Volume x 100		
RECOMMENDED ACTIONS		
<input checked="" type="checkbox"/> Re-engage	<input type="checkbox"/> May need re-engage soon	
<input type="checkbox"/> Monitor print quality	<input type="checkbox"/> Clean & monitor print quality	
Recommendation made by Tabatha McDonald	Approved by Mike Poppen	



Condition

- Channeling between cells
- Cell wall damage

- Broken cell walls
- Poor cell geometry
- Low volume

RECOMMENDED ACTIONS

- Re-engage
- Monitor print quality
- May need re-engage soon
- Clean & monitor print quality

Recommendation made by

Tabatha McDonald

Approved by

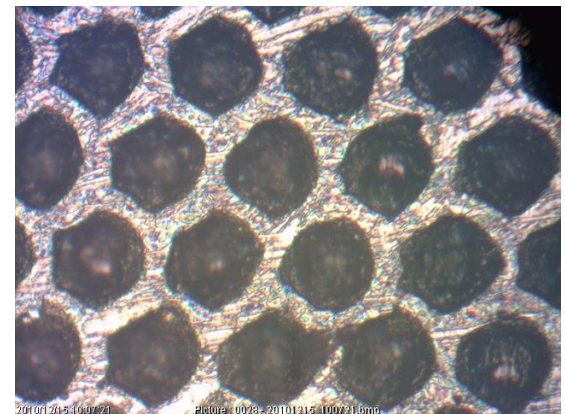
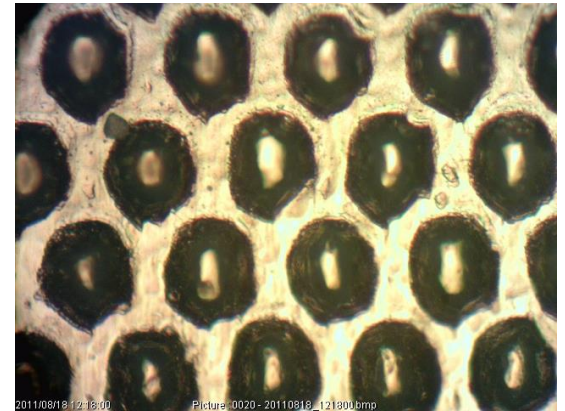
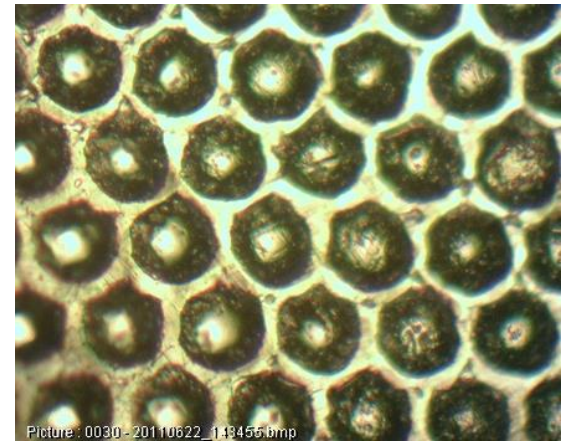
Mike Poppen

Cell Wear

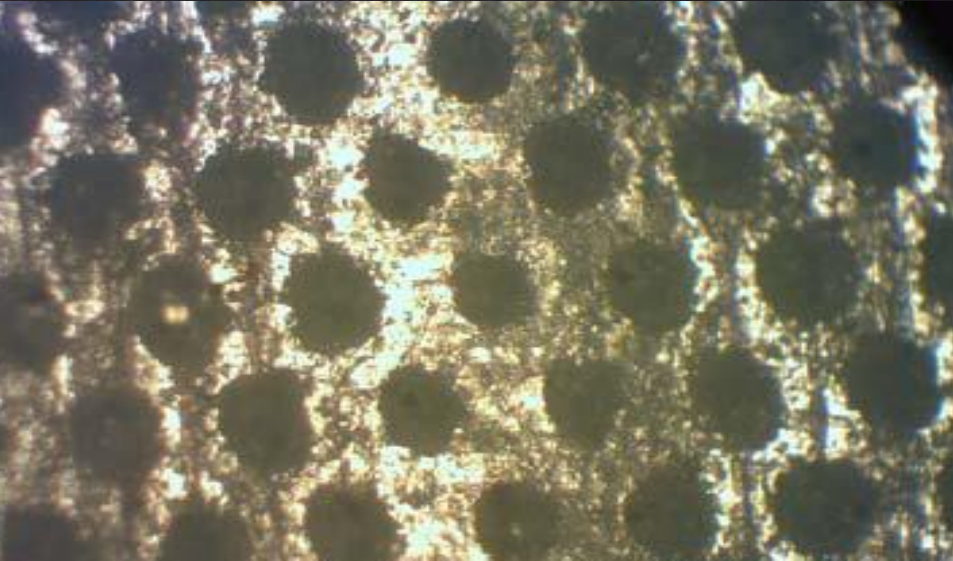
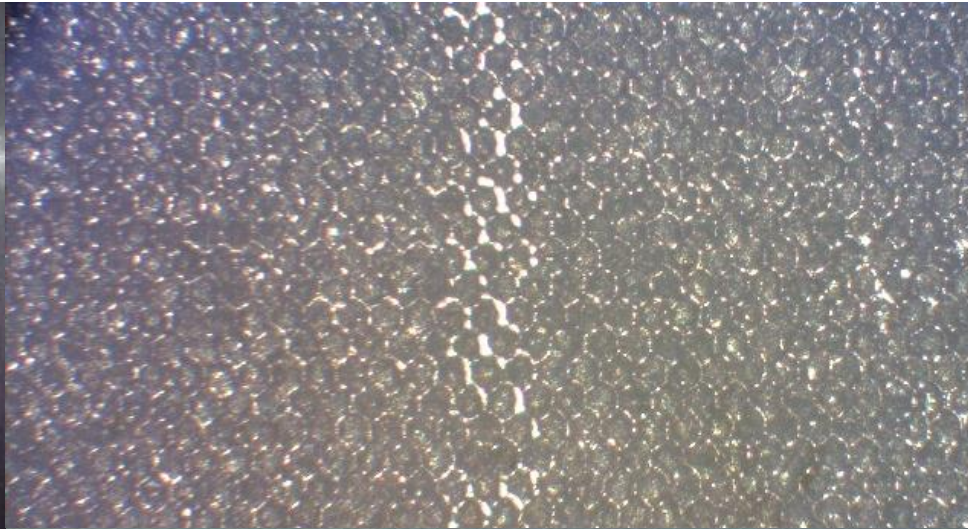
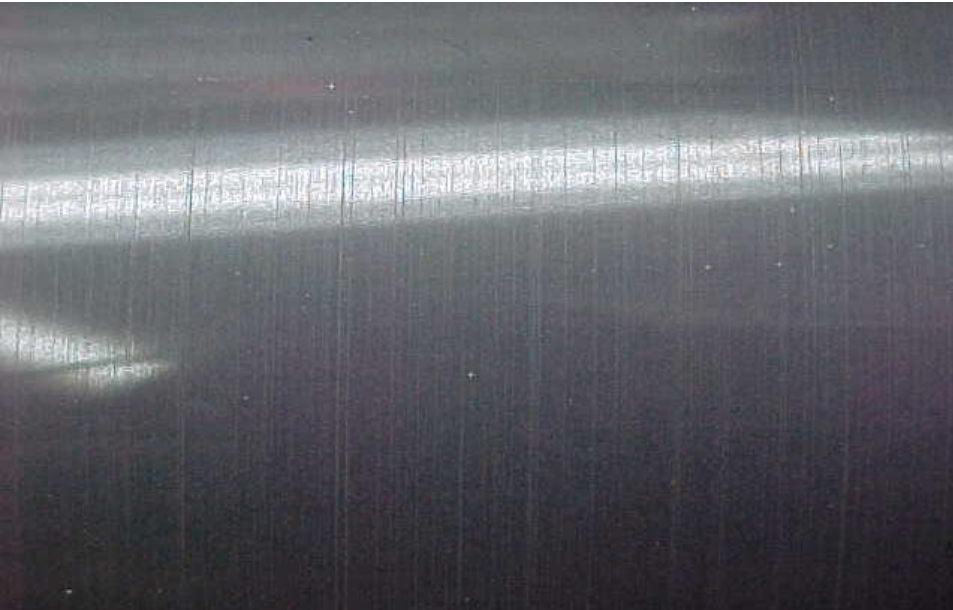
As engraving wears:

- walls get wider
- cells get shallower
- lower volume
- less color density

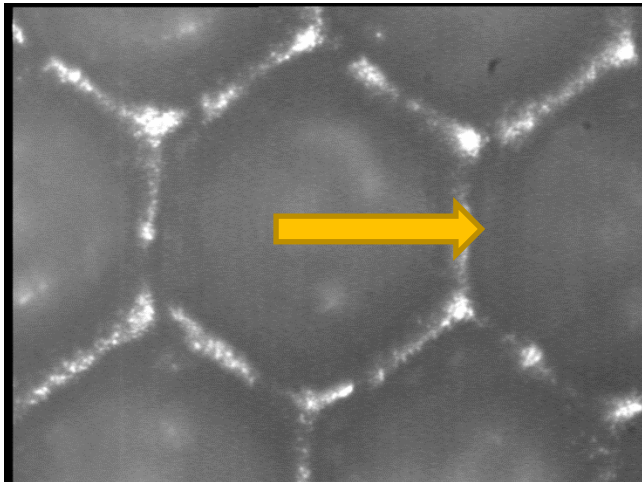
85% Plus Effective Volume
Is Recommended



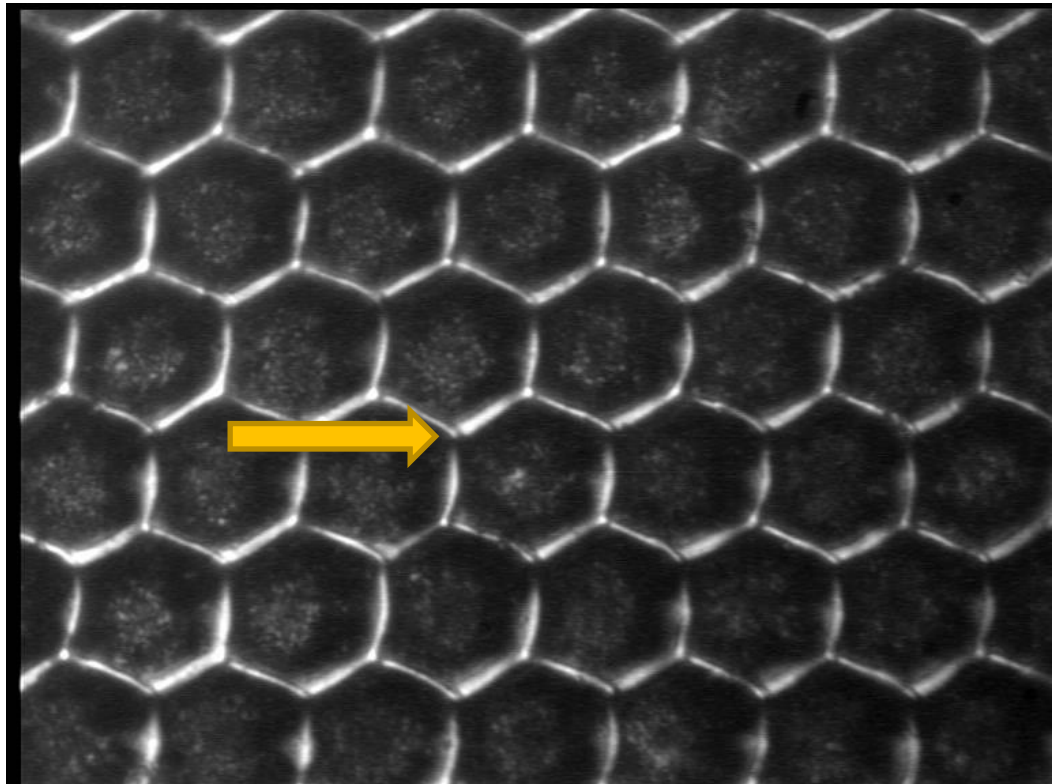
Score Lines & Premature Wear



Score Lines & Premature Wear



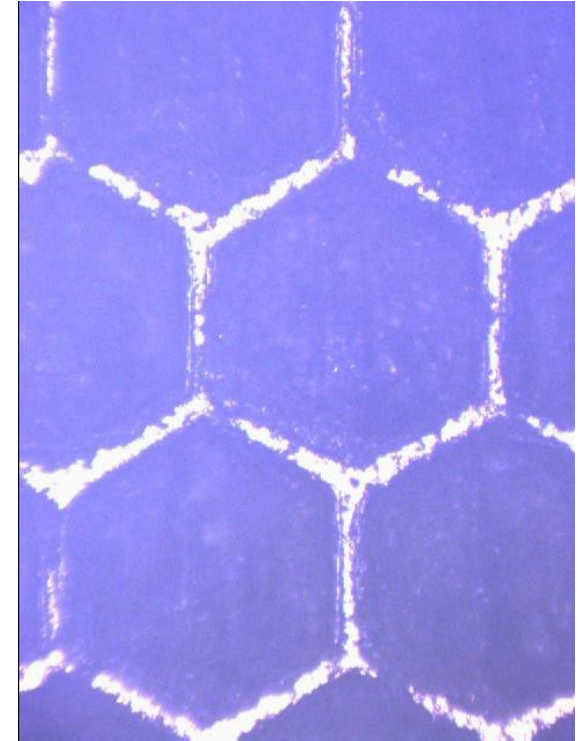
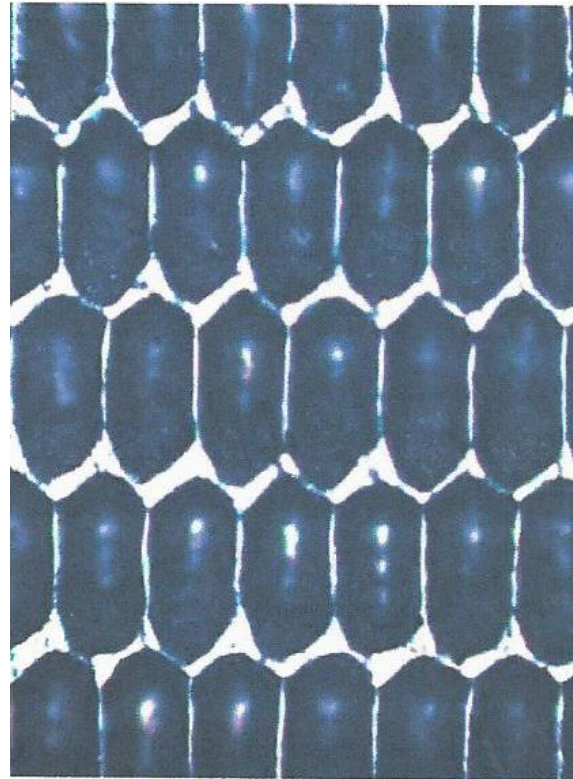
Recast Nodules



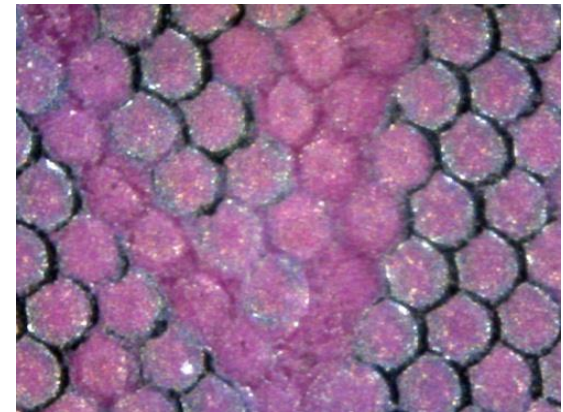
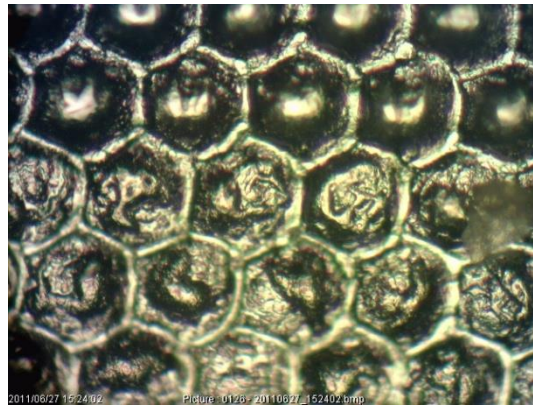
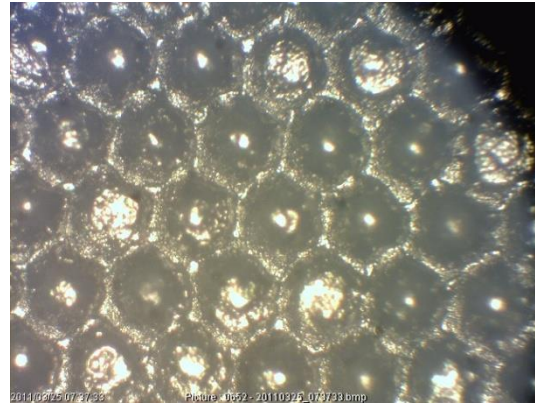
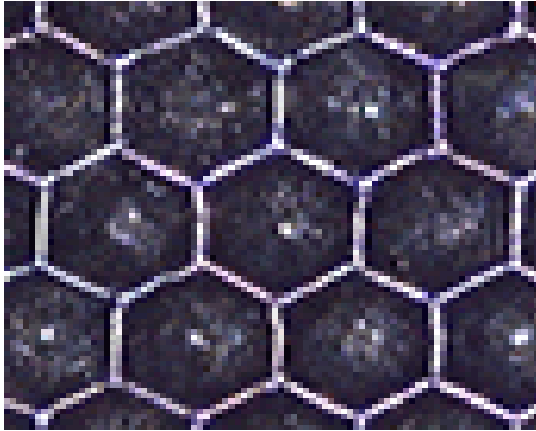
Magnetic Ink Filters



Machine Polishing After Engraving



Anilox Plugging



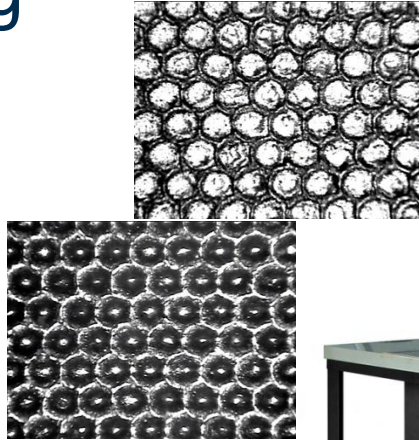
Anilox Roll Cleaning

The Ideal Time To Clean The Anilox Is
While The Ink Is Wet!

*Off press cleaning processes should
be a supplement to
good on press cleaning procedures!*

Anilox Cleaning Processes

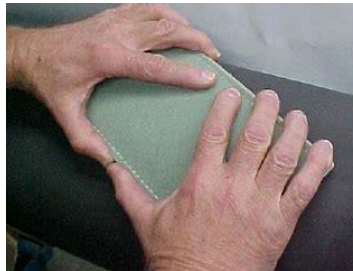
- Hand Cleaning
- Ultrasonic
- Baking Soda
- Micro Clean
- Flexo Wash
- Lasers



EZ Clean



PRS Scrubber





Thank You