

The FPPA Project Committee

- Tim Moore, Chairman, Southern Graphic Systems
- Tom Underwood
- Kevin Koelsch, Dynamic Dies
- Mark Barnard, Trinity Graphics, USA

The Project Work Team

- Chairman: Tim Moore, Southern Graphic Systems, Mac Bee, SC
- Kern Cox, Clemson Print/Con Center, press operator
- Rory Marsoun, press helper Clemson
- Garrett Long, SGS, Measurement and data analysis
- Page Crouch, observer & helper

Our Panel of Plate Suppliers

- Colleen Twomey – MacDermid Printing Solutions
- David Chinnis – Flint Group Printing Plates
- Bob Hannum – DuPont Imaging Technologies

The Corrugated Plates Made Press Ready

- Tim Moore, Chairman of the Project Team
- Southern Graphic Systems
- "MacBee," South Carolina

Write down your questions and
the panel will discuss them after
the findings are presented.

The Big Question

Is there a difference in print
qualities of various plates and
mounting systems commonly used
for direct print corrugated graphics?

More Specifically . . . the common issues in corrugated printing include:

- the undesirable appearance of flute marks, particularly in even tones.
- the predominance of excess volume and course line anilox rolls.
- the all too common practice of running excess impression.

There certainly are many more items that could be added to this list, but these were considered the “leading issues.”

State of Postprint Corrugated Plate Packages

- Informal survey revealed wide variety of plates and underlayments in use
 - different durometers of plates
 - liquid and sheet
 - digital and analog
 - foam and no foam
 - PVC and no PVC carriers

There's a lot of options,
but do they perform any
differently on press?

Plate Suppliers Invited to Submit Two Packages to Specifications and a Third of Their Choice

- DuPont
- Mac Dermid
- Flint Group
- Benchmark - .155 TDR on .030 PVC
- Peelable Plate recommended for inclusion by survey

The Plate Packages

- All plates .125" thick.
- All exposure procedures and tools were the same.
- Each supplier invited to submit an analog and a digital package.
- A "special" plate was allowed to permit a "supplier's choice."
 - Digital, analog, sheet and liquid plates were included.

Plate & Backing Specifications

- A - Special, Peelable Plate, TPT = .184, RD = .042
- B - Digital .125, Mounted with Rogers 3120 tape to .040 R/Bak SFG, foam to cylinder, TPT = .187, RD = .033, 39 duro.
- C - Special .107 Digital mounted with Rogers 3120 tape to .060 R/Bak SF, foam to cylinder, TPT = .192, RD = .032, 52 duro.

13

Plate & Backing Specifications

- D - Special, .107" Digital mounted on .080 R/Bak SF, mounted to foam, backing to cylinder, TPT = .190, RD = .035, 52 duro.
- E - Analog .125 mounted to base of .060 Adheso, foam to cylinder, TPT = .186, RD = .050, 39 duro.
- F - Digital .125 mounted to base of .060 R/Bak, TPT = .190, RD = .040, 36 duro.

14

Plate & Backing Specifications

- G - Analog .125 Liquid capped, mounted to foam side of .060 R/Bak, base to cylinder, TPT = .193, RD = .054, 32 duro.
- H - Analog .125 mounted to .060 R-Back, TPT = .187, RD = .055, 36 duro.
- I - Benchmark, .155 Analog, mounted to .030 PVC, TPT = .185, RD = .055, 37 duro.

15

1. What plate packages demonstrate greatest latitude when printing different ink films?

- 1. Heavy ink film achieves good solid coverage; low variance in solid uniformity.
- 2. Too little ink = high variance in solid print uniformity. Every plate will have some variance in low volume bands.
- 3. The smallest ratio between no. 1 and no. 2 is the plate package with greatest "latitude" of ink film thickness.

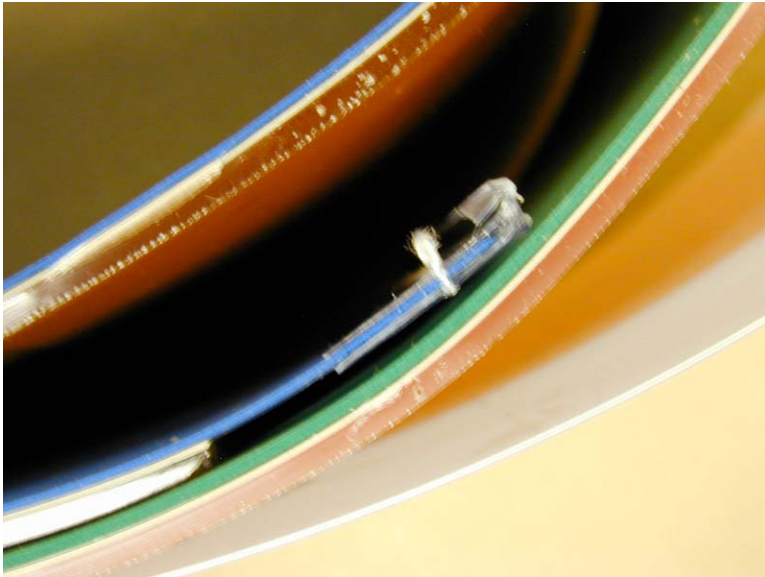
2. What Plate Package Demonstrates Least Dot Gain?

- 65 lpi scales were measured
- Curves were plotted to show the comparisons

3. What plate packages demonstrate least fluting in 400-3.8 volume band?

- After an examination of all packages, the 400- 3.8 volume band was selected for this comparison.

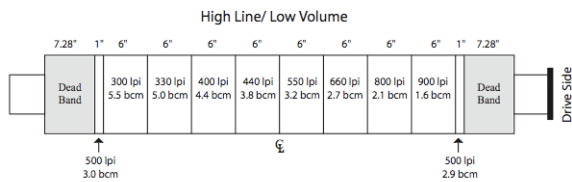
4. What plate packages show best over impression latitude?



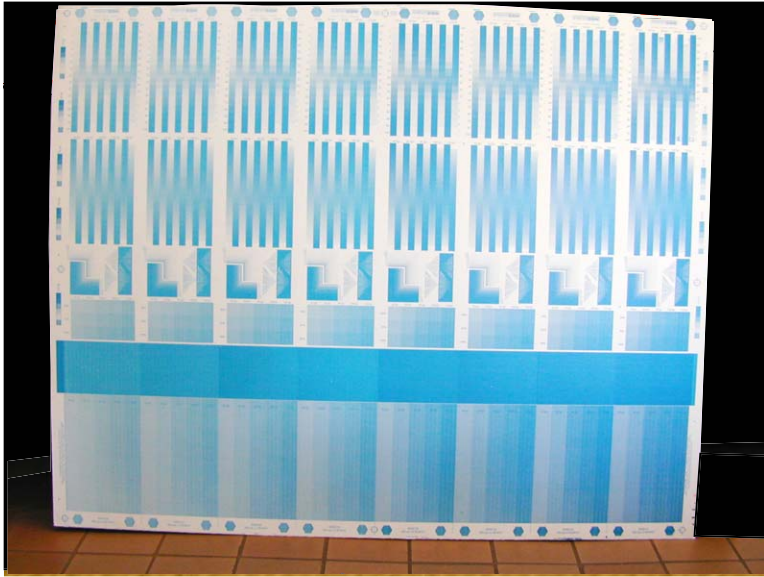
Substrates & Ink Used

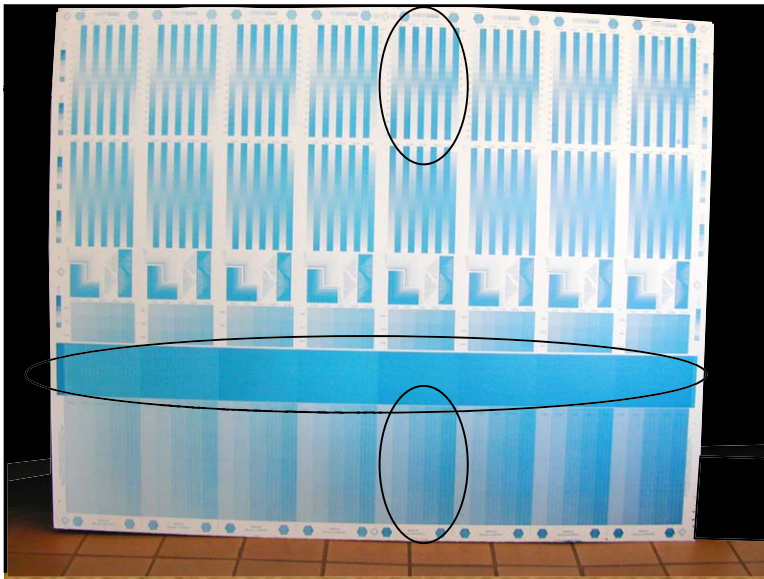
- B and C-Flute, "commonly used white top, uncoated liner."
- Cyan ink was used
- Nine "plate packages" were run

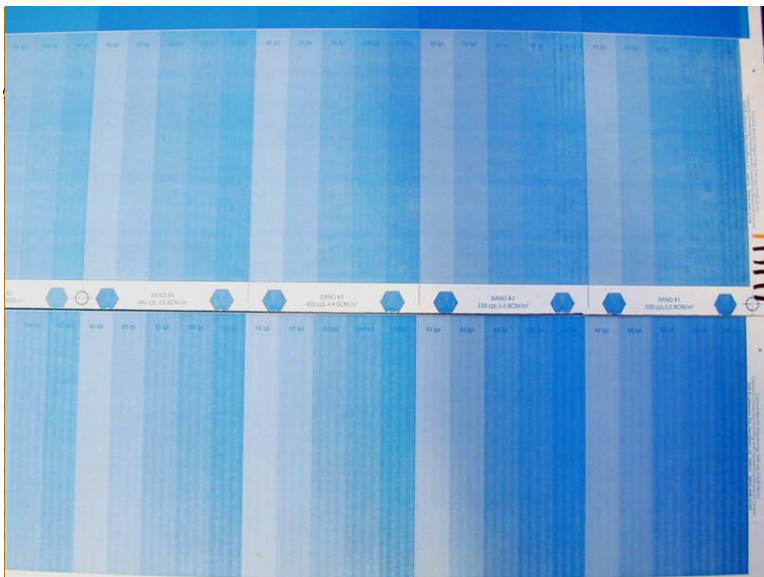
The Banded Roll for Specified Ink Film Thicknesses













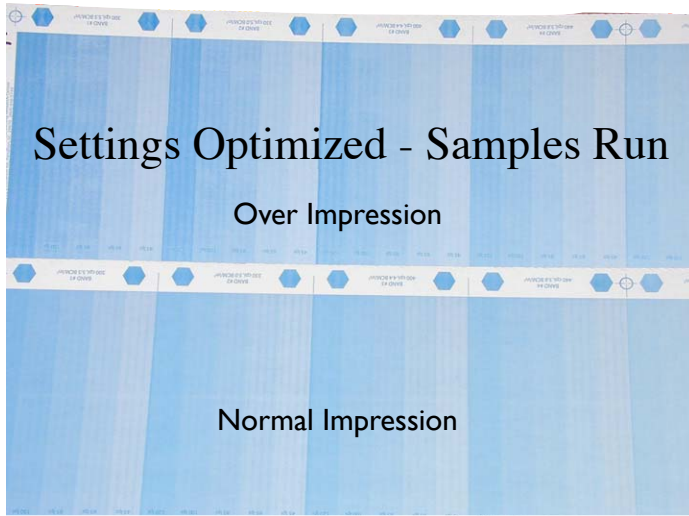












32

Flexographic Pre-Press Platemakers Association
Report of Corrugated Plate Packages Study - 2007

Run Protocol

- Run 100 Optimum B-Flute
- Pull Sheets - confirm quality
- Run Over Impression - +.5 mm/.020"
- Pull Samples
- Organize samples

33





Flexographic Pre-Press Platemakers Association
Report of Corrugated Plate Packages Study - 2007

Samples Cut and Sent to SGS, Garrett Long

- SGS McBee cut & labeled the samples and sent to Garrett.
- Garrett developed the analysis processes,
- Performed all readings and analyzed all data from normal and over impression samples.

35

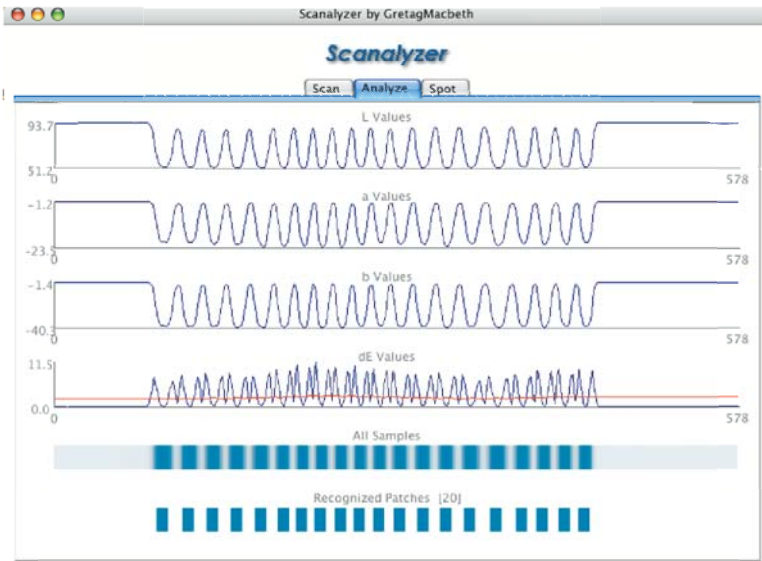
Flexographic Pre-Press Platemakers Association
Report of Corrugated Plate Packages Study - 2007

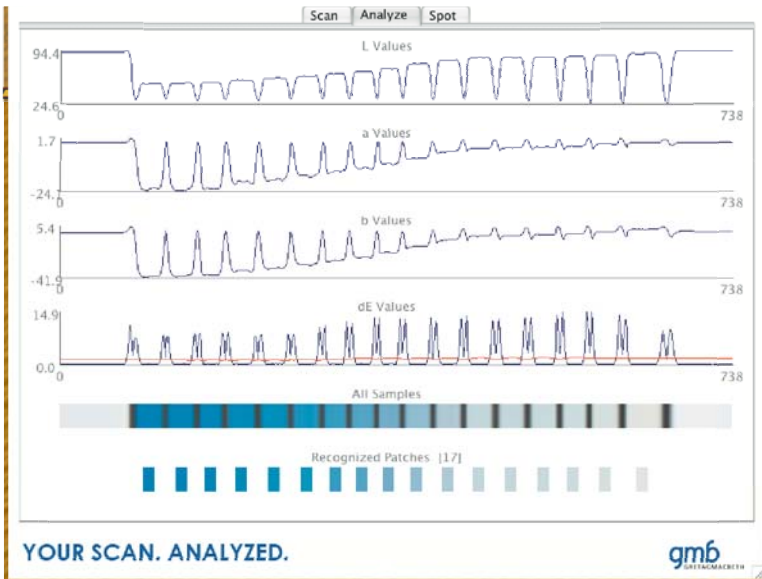
Reflectance Paper & Ink

Wavelength (nm)	Paper Reflectance (%)	Ink Reflectance (%)
380	45	15
420	70	35
460	78	50
500	80	45
540	80	25
580	80	10
610	80	5
620	80	5
660	82	5
700	83	5
740	84	5

This ink is most dense at 610nm

36

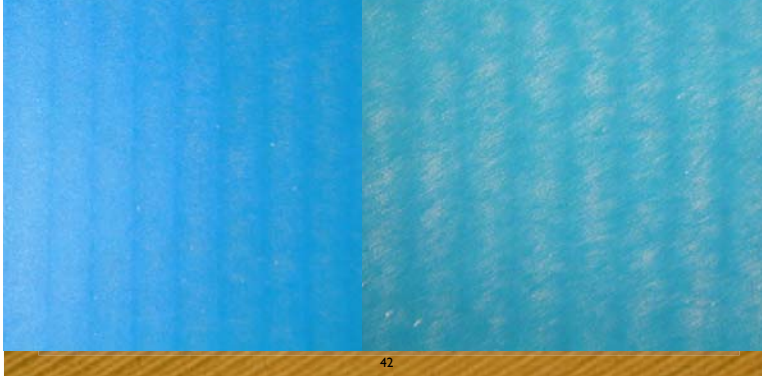




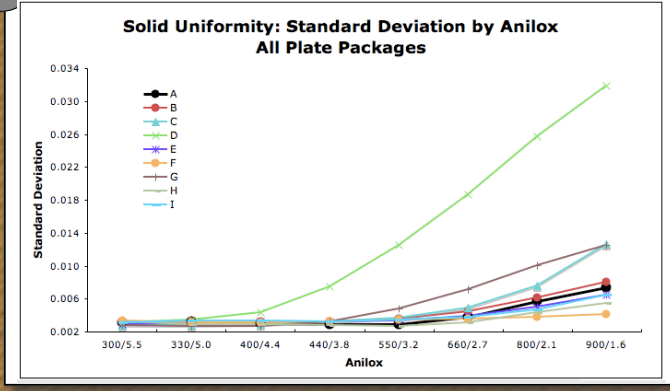
YOUR SCAN. ANALYZED.



Typical and Worst Case of Solid Uniformity of the 2.7 BCM Band



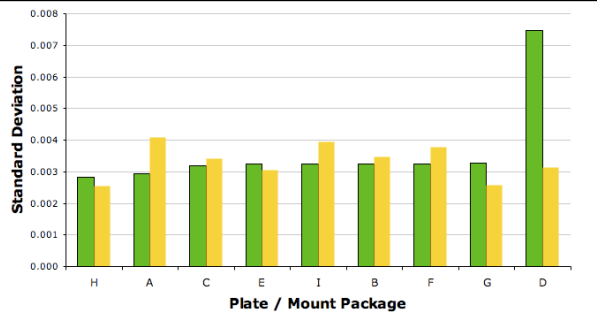
Anilox Volume Solid Uniformity



Normal Impression Solid Uniformity 400-3.8 Ink Film

- 440/3.8 was selected as the "fulcrum" point in this study, as it is believed to represent the best compromise between solid uniformity and ink film thickness

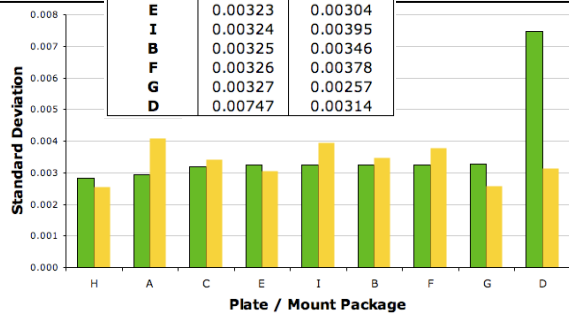
Normal Impression Solid Uniformity 400-3.8 Ink Film



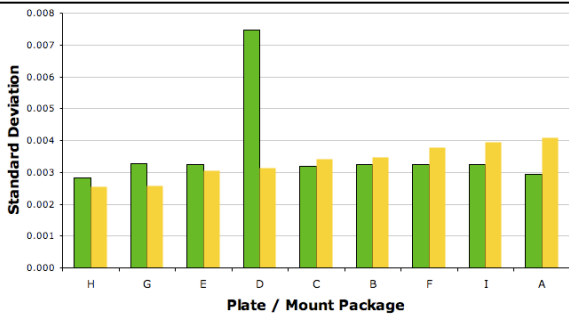
Solid

Plate Package	Normal	Over-Imprinted
H	0.00283	0.00256
A	0.00293	0.00407
C	0.00318	0.00340
E	0.00323	0.00304
I	0.00324	0.00395
B	0.00325	0.00346
F	0.00326	0.00378
G	0.00327	0.00257
D	0.00747	0.00314

**Over Impression
 3.8 Ink Film**



**Over Impression
 Solid Uniformity 400-3.8 Ink Film**



**Plate Packages Ordered by
 Anilox Latitude (100% is Best)**

- Anilox Latitude is the ratio of 330/5.0 stand. dev. to 660/2.7 stand. dev. Values closer to 100% are better. A value lower than 100% indicates that variation increases among anilox volumes.

Plate Packages Ordered by Anilox Latitude (100% is Best)

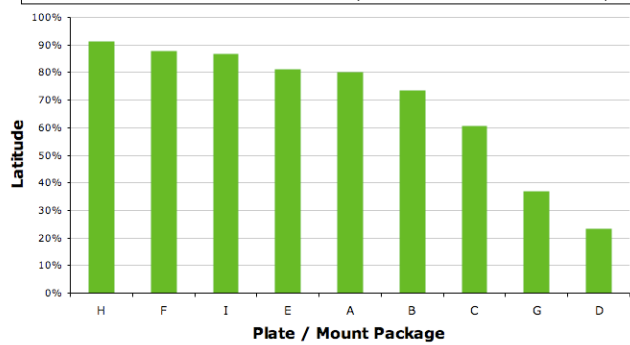
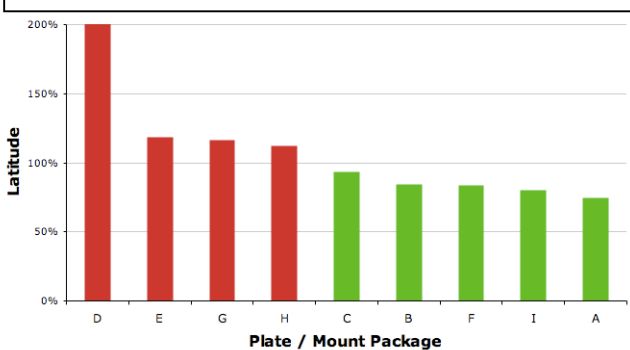


Plate Packages Ordered by Impression Latitude (100% is Best)

- Impression Latitude is the ratio of "normal" impression Standard Deviation (with a 400/3.8 anilox) to "overimpressed" Standard Deviation. Values closer to 100% are better. A value greater than 100% indicates that overimpression improves solid uniformity. A value less than 100% indicates that overimpression degrades uniformity.

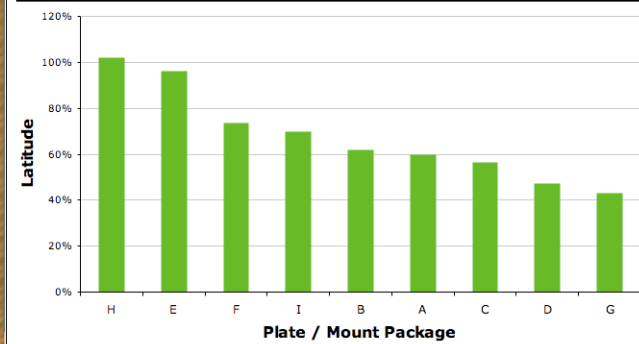
Plate Packages Ordered by Impression Latitude (100% is Best)



Ordered by Combined Impression & Anilox Latitude (100% is Best)

- Combined Latitude is the product of Anilox Latitude and Impression Latitude figures for each plate
- the best package has 100% latitude for anilox selection and overimpression.

Ordered by Combined Impression & Anilox Latitude (100% is Best)



Dot Gain Data

- These Data were measured from "normal" 65 LPI tone scales in the 440/3.8 anilox band from each package. Each case is the average of two measurements from two scales running in opposite directions (total 4). For each scale, an attempt was made to capture both on- and off flute lines.

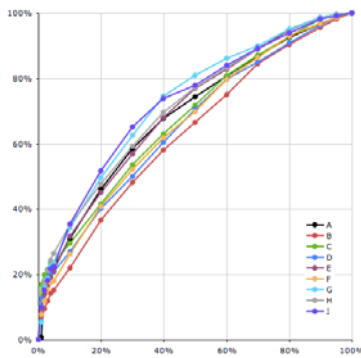
Caution Interpreting Data

- We should not attempt a ranking by dot gain because (a) we don't know the effect of platemaking techniques (b) Dot Gain Compensation is the domain of prepress.

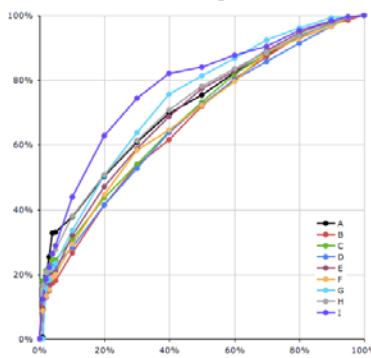
Here is the raw dot area data for 65 lpi in 440-3.8 band

"Normal" Impression, 65 LPI, 440/3.8 Anilox									
Tint	A	B	C	D	E	F	G	H	I
0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
1%	0.8%	7.0%	17.0%	12.4%	8.2%	7.9%	5.4%	9.8%	9.9%
2%	16.3%	9.5%	19.9%	16.0%	14.0%	11.8%	16.4%	17.5%	15.1%
3%	19.7%	11.9%	21.5%	19.0%	16.5%	15.4%	18.9%	20.9%	18.1%
4%	22.0%	14.2%	23.4%	20.0%	19.1%	17.4%	22.6%	24.4%	21.7%
5%	22.2%	15.1%	23.3%	20.8%	20.9%	18.0%	23.5%	26.3%	22.4%
10%	30.9%	21.9%	29.5%	27.0%	31.6%	26.2%	34.2%	35.2%	35.4%
20%	46.1%	36.5%	41.6%	40.2%	45.1%	40.9%	49.6%	47.7%	51.7%
30%	58.6%	48.2%	53.6%	50.1%	56.9%	52.2%	62.4%	59.1%	65.1%
40%	67.7%	58.1%	62.9%	60.4%	67.9%	61.7%	74.6%	69.6%	73.9%
50%	74.3%	66.6%	71.8%	70.5%	76.9%	69.9%	81.0%	77.2%	77.8%
60%	80.6%	75.0%	80.8%	79.7%	82.7%	79.7%	86.1%	83.2%	83.9%
70%	86.8%	84.4%	87.0%	85.0%	88.8%	86.4%	89.9%	88.9%	89.1%
80%	92.4%	90.4%	92.7%	90.9%	94.9%	93.0%	95.0%	93.9%	93.8%
90%	96.6%	95.6%	98.0%	96.2%	98.5%	96.7%	98.6%	98.1%	98.2%
95%	98.5%	98.0%	99.5%	98.6%	99.5%	98.6%	99.6%	99.2%	99.1%
100%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Solid	1.16	1.20	1.19	1.16	1.17	1.24	1.17	1.19	1.14
Paper	0.10	0.10	0.10	0.11	0.11	0.10	0.10	0.11	0.11
Print Contrast	32.3%	37.5%	33.2%	34.9%	28.8%	35.3%	27.6%	29.3%	27.7%

"Normal" Tone Reproduction
 All Packages



"Overimpressed" Tone Reproduction
 All Packages



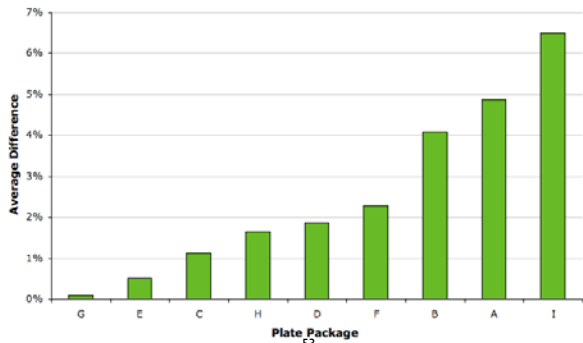
Tonal Impression Latitude

Package	Average Difference
G	0.1%
E	0.5%
C	1.1%
H	1.6%
D	1.9%
F	2.3%
B	4.1%
A	4.9%
I	6.5%

This is the average difference in Dot Area between "normal" and "overimpressed" measurements in the tint range between 2% and 60%. Lower is better. 0% implies a perfect relationship between normal and overimpressed.

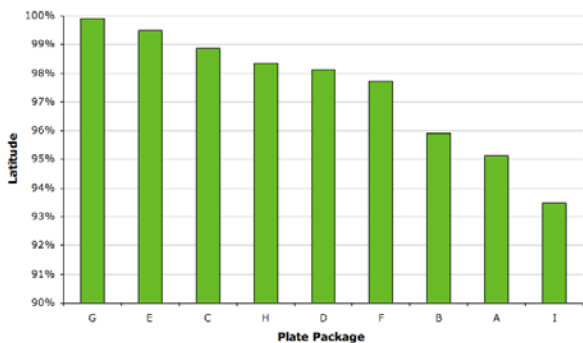
Tonal Impression Latitude

Average Difference Between Normal and Overimpressed Dot Area (0% is best)

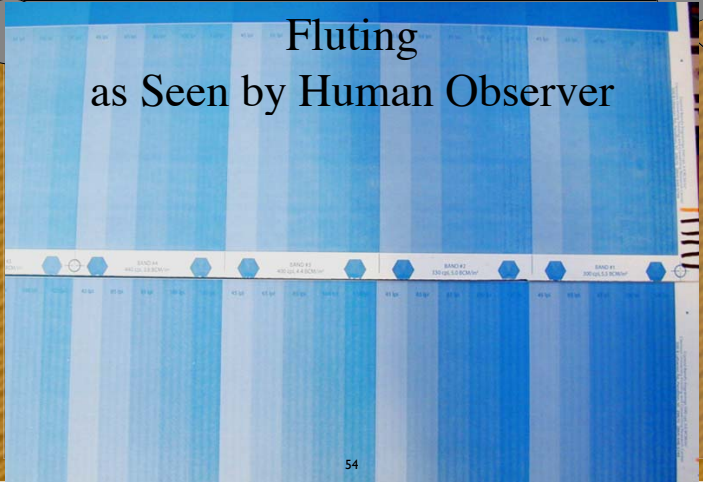


Tonal Impression Latitude

Plate Packages ordered by Tonal Impression Latitude (100% is best)



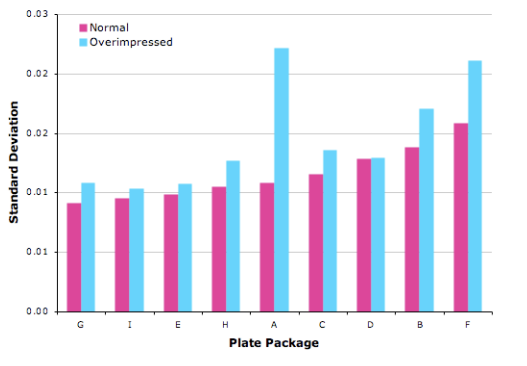
Fluting as Seen by Human Observer



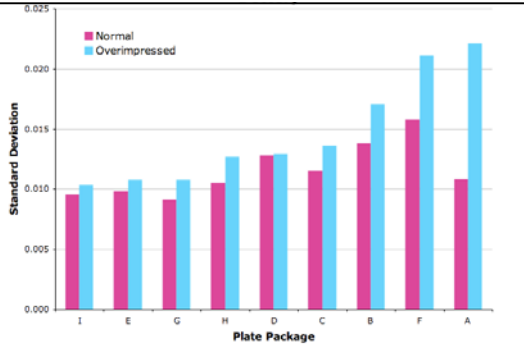
Fluting Ranked Normal Impression

For Fluting tests, we took 160 measurements from each sample in strips of 20 patches. So, there were 8 strips, alternating on top and between flutes (80 patches on top, 80 between). Standard deviation of all 160 patches was calculated for each sample. We had both "normal" impression and "overimpressed" samples for each plate package. The chart below shows packages ordered by Standard Deviation of "Normal" impression samples, from best to worst.

Fluting Ranked Normal Impression

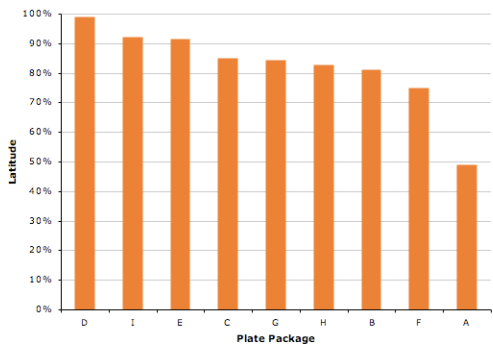


Fluting Ranked by Over Impression



56

Plate Packages Ordered By Fluting Impression Latitude (100% is best)



57

Fluting Images as Seen by Scanner

Normal impression

- Best Fluting Latitude

Over impressed

58

Worst Fluting Latitude

Normal impression

Over impressed

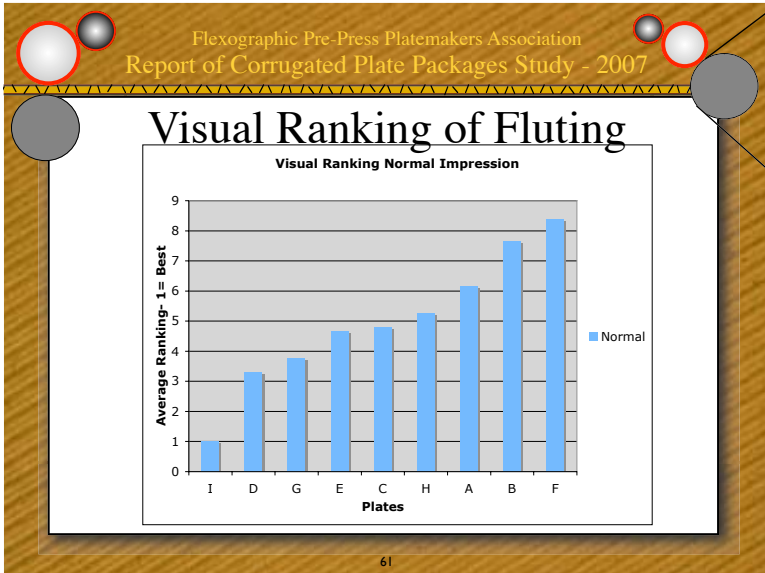
Human Ranking of Fluting Samples



Human Ranking of Fluting Samples







Visual Ranking of Fluting

Visual Ranking of Fluting Normal and Over Impression

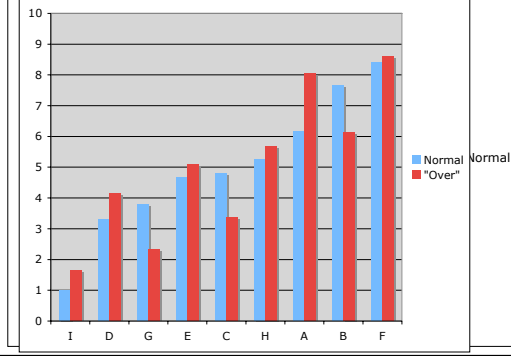
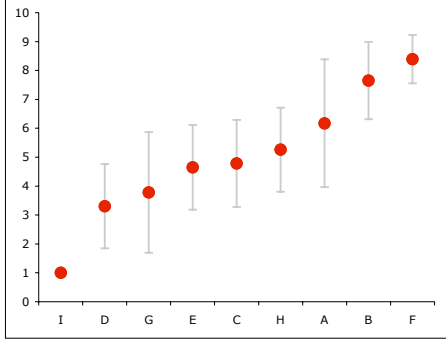
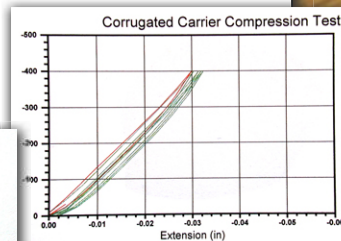
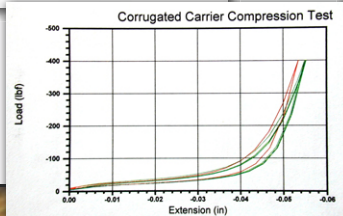
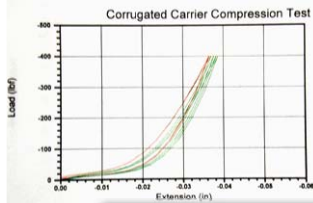


Plate Packages Ordered By Average Rank
Normal Impression



Instron Tests of Load Vs. Plate Displacement

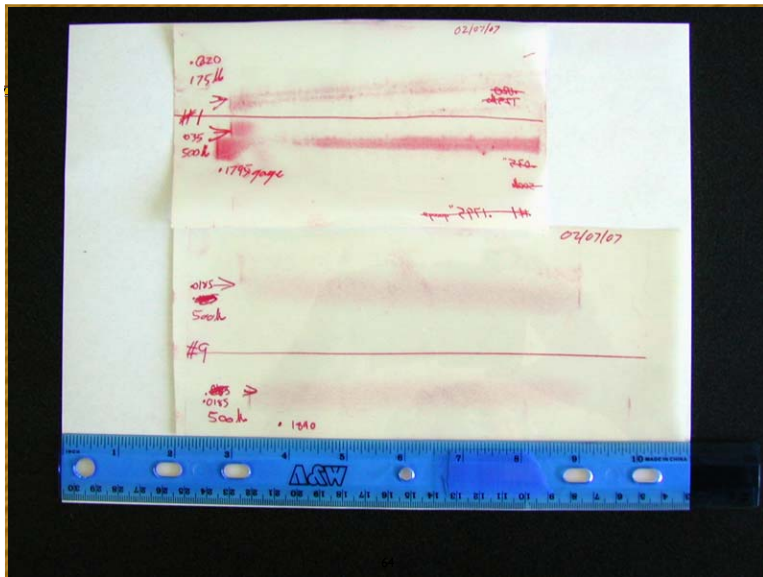
Help From Day Intl's Will Goss



Nip Width/Signal Width

- Will Goss tested samples at Day International

64



Please be thinking of the questions to be considered in future FPPA research.

65

Doesn't it feel good to
finally have all the answers.

- Life long learning, "getting over
being cock sure and ignorant."

(Dr. Will Miller, MU Columbia)
