

## A REPORT ON THE PERCENT IMAGE AREA MEASUREMENTS TAKEN FROM PLATES USED IN THE GCA 1985 PRINT PROPERTIES TEST

R. S. Fisch\* and R. D. Cavin\*

For the last 3 years the Print Properties Committee of the Graphic Communications Association (GCA) has run a series of print studies on various aspects of the lithographic reproduction printing process. The most recent test was conducted for the Spectrum meeting of the GCA in Phoenix in September, 1985 and the evaluation of the ink on paper results were presented at that time.

Earlier print properties' tests did not include an evaluation of the percent image area characteristics of the printing plates used in any of the studies. Formerly the state-of-the-art in the definitive determination of lithographic dot images on metal substrates was such that the numbers derived were at best inconclusive.

Recent advances in electronic aided computer enhanced image evaluation techniques prompted the 1985 Print Properties Committee to attempt an evaluation of the percent dot area values on the printing plates used to conduct the 1985 study.

The Printing Products Division of the 3M Company volunteered to use its expertise in printing plate technology and evaluation to perform this analysis. The technique chosen and some insights from the data obtained from a partial evaluation of this test will be the subject of this report to TAGA.

### Background and Test Conditions

The color bar target chosen for this test was provided by World Color Inc. of Eppingham, Illinois.

\*3M Company

***Plate Measurements  
GCA 1985  
Print Properties Test***

It consisted of a 5mm wide color control bar containing test elements which include screen tints of 25%, 50%, and 75% dot areas, solid patches of the primary and secondary colors and the GATF Dot Gain II Target. The instructions for this GCA test specified the placement of this target in the center of the printed form. A UGRA Plate Control Wedge was also specified as an additional test target that was to be imaged onto the plate's gripper edge.

Each of the participating sites were given the test targets and asked to produce production plates at standard shop conditions and there were no restrictions as to plate type or manufacturer. The actual brand of plate and plate exposing conditions were known only to the test site, each of the test sites were coded to maintain security. Coded plate samples were sent to 3M for analysis. At least half of the plates received were ink laden and another portion bent out of shape. A mild solvent application was used to clean the ink off the ink laden plates for analysis purposes. Contrary to the Print Properties Group suggestion, only a portion of the UGRA Targets were received back for evaluation. The data reported here will only pertain to the analysis of the World Color Bar Target (25%, 50%, and 75% areas).

The original intent of the Print Properties Test was to investigate the effect of changes in the ink formulation on the final dot quality, ink on paper. The test was conducted in 2 phases. The first phase was to establish the reproduction characteristics of the site under test as a reference point (three different press runs were programmed into that first phase). The data, printed results and samples of the targets on the printing plates of each of these press runs were collected separately.

A second phase of the test was run at a later date. This phase has been called Phase 2 and it consists of Parts A and B. Part A was a repeat of Phase 1 using the shop's conventional inks and served as a control for Part B. Part B used the cleaned plates of Part A with a set of specially constituted inks to help determine the effect of some ink properties on dot gain. I would again

like to stress that the same printing plates were used for Phase 2 - Parts A and B. The plate and plate exposure used were supposed to be the same and so it was felt that a pool of the data from each of the sites was statistically proper.

### Evaluation

For purposes of the plate study the 3M Zeiss IBAS Image Analysis System with its proprietary image analysis programs was used as the measuring tool.

### Slides Showing the Zeiss

The optical train of the Zeiss device includes a Zeiss Microscope operating at approximately 125X magnification, a video camera for image capture and proprietary computer analysis programs to determine the effective percent dot area for the 25%, 50%, and 75% tint areas.

The following table indicates the statistical results that can be expected through the use of this technique and software package.

98% Confidence Level / 3 Sigma + 1/2%

### Slide 4 - The Standard Deviation Expected

The 25%, 50% and 75% tint areas of each of the submitted printing plates were measured in four different areas for each tint. A total of 12 measured points were taken for each sample. The data is available on a statistical basis for each test site and can be shared with them for their quality purposes. The identification of each site was kept in confidence and a code assigned that is known only to the site.

When the samples were inspected at 3M it was found that some were identified clearly as to which phase they were part of and others were not identified at all. Since the same plates were to be used, regardless of phase, it was decided that the data was still useful and should be included in this report. The plates that did not come specified as to which phase they were part of have been labeled



## Variability of Dot Area Measurements From Repeated Measurements

Negative Acting Presensitized Printing Plates  
50% Dot

<u>Sample #</u>	<u>N</u>	<u><math>\bar{x}</math></u>	<u>Standard Deviation</u>	<u><math>3\sigma</math></u>
1	12	49.7%	0.32	0.94%
2	16	51.01%	0.24	0.48%

Phase 0. Some sites only sent in one set of plates and for them only one set of data appears on the slides that will depict the test results. For purposes of this paper we shall compare the statistical data per site according to the phase information and then present the fully pooled information per site.

Caution is advised in the interpretation of the data since the test targets were not of commercial origin and were not initially calibrated by use of the Zeiss device.

Slides Presenting the Phase Results Per Site  
25%, then 50%, then 75%

The Red bars represent the samples that were received and not assigned a phase by the submitting site.

The Orange bars represent the samples marked Phase 1 and the Yellow bars Phase 2. Ideally all of the results per site should have been identical. As you can see some sites do a better job than others. Site 126 seems to do an overall better job than most. Site 138 seems to be having consistency difficulties. A change of value or consistency between tints in any one site can be taken as an indication that tone reproduction will change.

Slides Showing Pooled Data Per Site By Tint Size  
Total Percent Combined

The pooling of the data smooths out the variabilities in the data from each of the sites. On average the sites then appear to be more uniform with respect to each other. Only Site 137 appears different than the rest. Caution should be exercised at this point. The data we are displaying from these different sites will be affected by the fact that some of these are using positive plates, some negative acting plates, and still others used Bimetal plates. The data from each of these different materials can not be intercompared with any statistically significant conclusions. Different plate materials, plate manufacturers and type, as well as exposure,

possible target variation conditions should be considered.

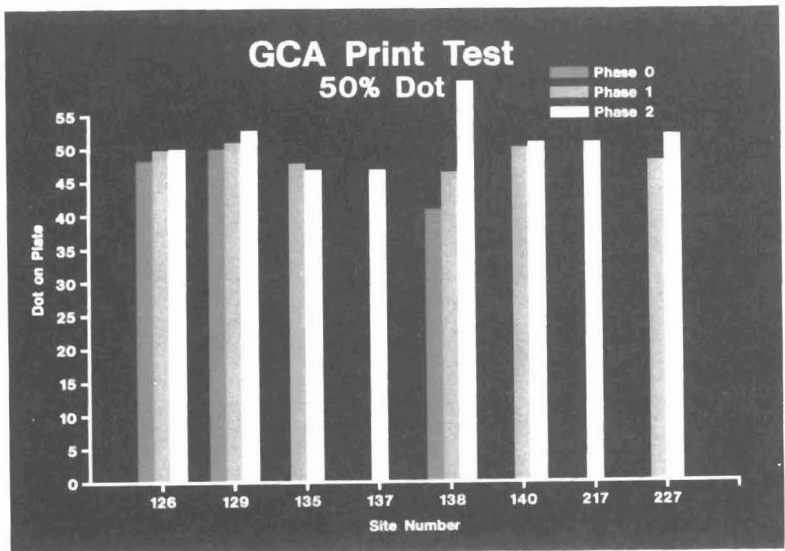
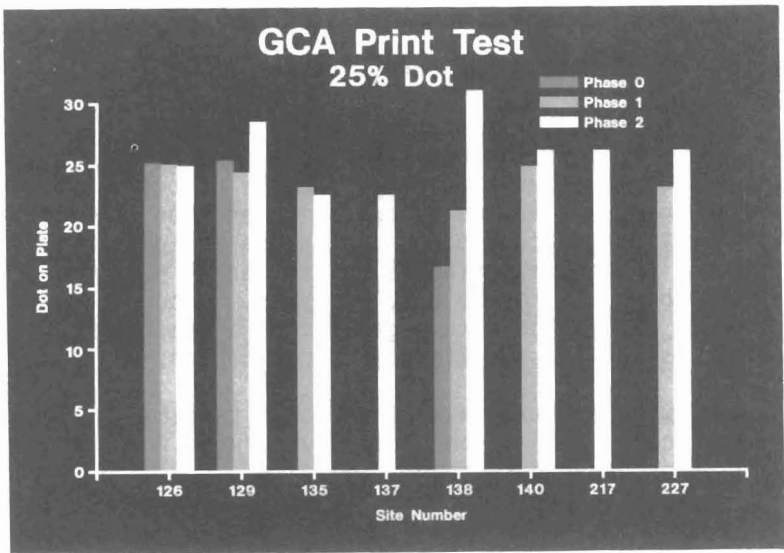
Another observation which we noted and we should point out is the fact that some of these plates appeared to have been run on press longer than others. This situation, of course, can influence the data. Because of all these variables we can really not project too much into the data analysis. Future tests will have to be more rigidly controlled for more statistically significant interpretation.

For future tests, each of the test targets should be calibrated by the same device used for the plate or page analysis.

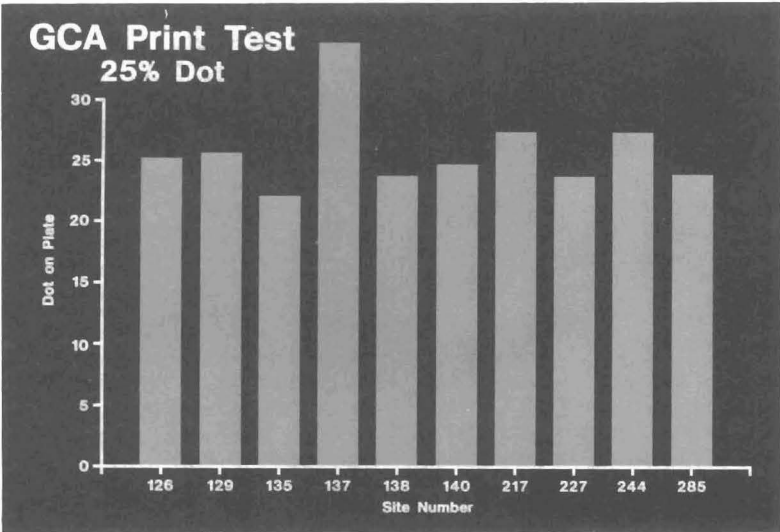
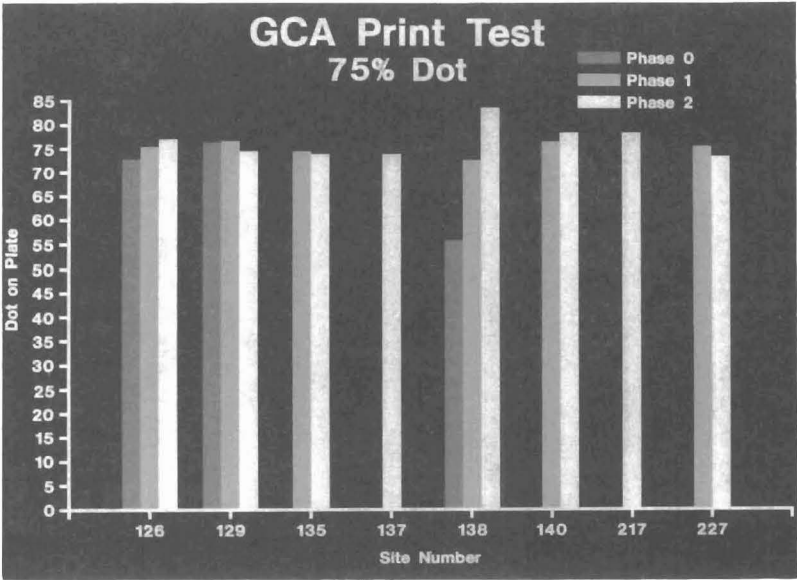
These data are presented here to demonstrate the capability of the 3M Zeiss System and to suggest further work involving its use. Since we do not have the relevant code site information, we invite those site representatives who know your code numbers to meet with us so we can show you our findings and suggest further areas of mutual assistance.

Finally, the authors wish to acknowledge the assistance of Mr. W. Ruda of 3M Company, Mr. R. Anderson of 3M Company and the members of the GCA.

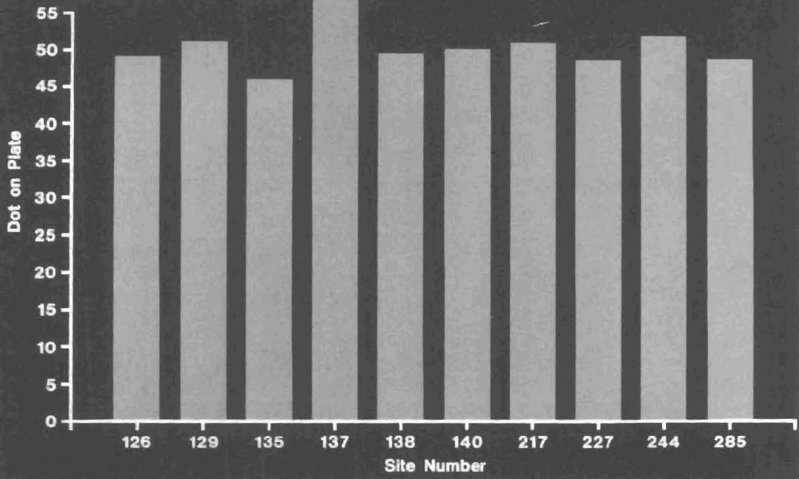
THANK YOU.



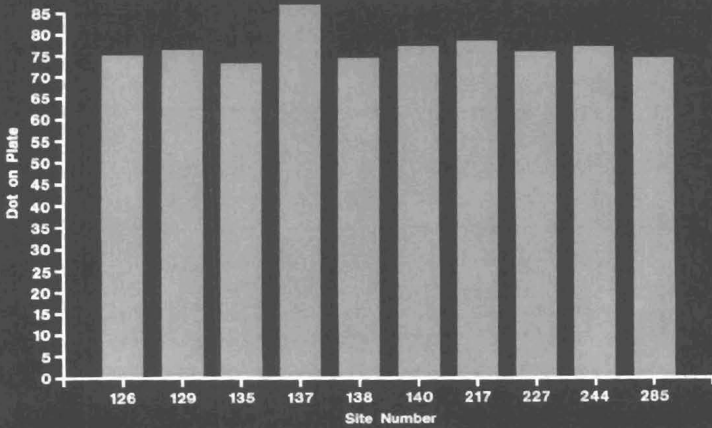




## GCA Print Test 50% Dot



## GCA Print Test 75% Dot



GCA SPECTRUM PLATE DOT IMAGE ANALYSIS  
AVERAGE DOT SIZE FOR ALL 275 PLATE READINGS  
NOTE: COMBINED NEGATIVE AND POSITIVE PLATES...  
3M COMPANY - PRINTING PRODUCTS DIVISION - 1986 / R.GAVIN

