

TEST METHODS AND CONSIDERATIONS FOR MECHANICAL GHOSTING IN LITHOGRAPHY

Raymond J. Prince*

Abstract: The paper will trace the technical development of a mechanical ghosting test form and explore the reasons for various design elements. The test form has been used in a large number of tests to evaluate many of the factors that influence mechanical ghosting on lithographic presses. Suggestions are given on how to reduce or eliminate mechanical ghosting; also, indications on the differences between systems are discussed. The paper outlines a systematic approach to test any press for the various types of mechanical ghosting that can occur.

Ink starvation ghosting is the occurrence of unwanted patterns of higher or lower density created by the job layout, combined with the press's inking ability. Mechanical ghosts can be seen in heavy solids or in heavy process work on both single and multicolor presses.

Scope of the Project

1. To establish a standard method of evaluating a press system for mechanical ghosting.
2. To establish a standard method for comparison of press systems.
3. To establish a method of documenting changes in variables on press as they affect mechanical ghosting.

The development of the test form began in late 1985 and was improved upon until early 1988. The form has been tested on many old and new presses, and has proven to be useful in characterizing types of ghosts and the degree of severity of the ghosting on any given press. It can help in the analysis of determining where the ghosts occur in a

*Graphic Arts Technical Foundation

given printing system, i.e. lead edge or trailing edge. The form also helps to indicate to what extent changes on the press affect the system. The form itself was designed to be very difficult to print. Many pressmen initially feel that the form is too difficult to print; however, after trying it on several presses, they find that it actually prints quite well.

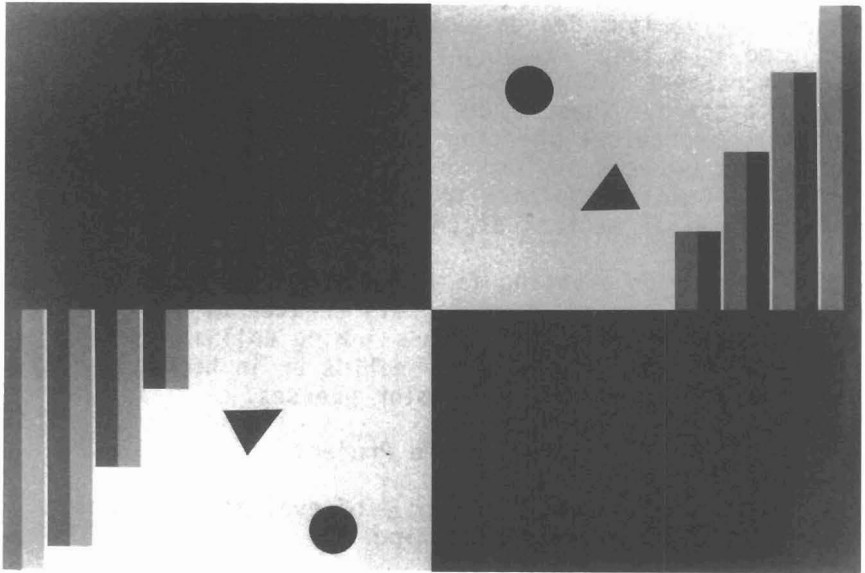


Figure 1. 1983 Ghosting Form

Figure 1 shows an early 1983 ghosting form that was run on a 40-in. press in cyan ink. The initial evaluation of this form indicated that the design was not nearly taxing enough to show the differences in ink and/or press settings. The press used to run this form did show a minor ghosting problem in production, and several items had to be changed.

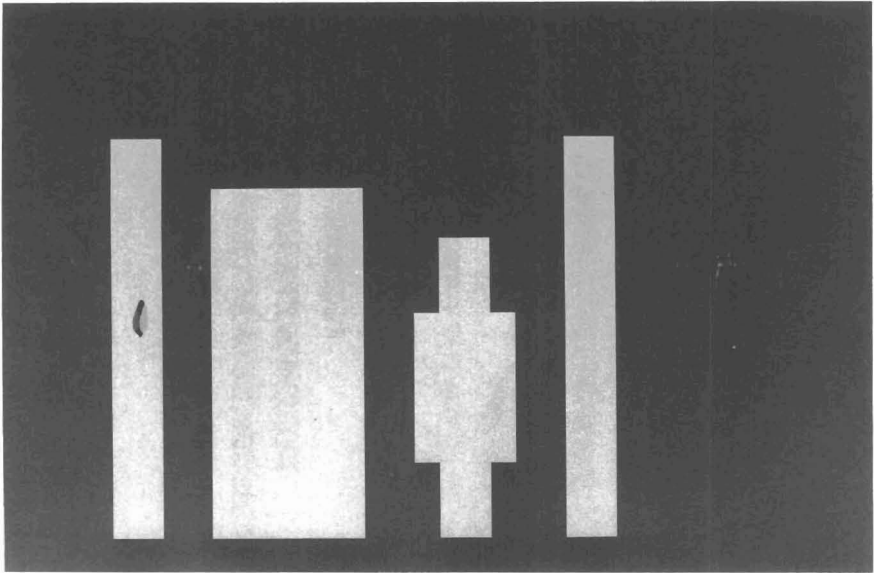


Figure 2. Dark Magenta Form

Figure 2 shows a very dark magenta form that was used to test a press that did not show a ghost. However, when the press was put in production, mechanical ghosting posed a problem in many cases.

Color

Choosing a color for printing the test form was difficult. Many colors were tried, including reflex blue--the one that most printers complain about. However, PMS 477 dark brown showed a ghost consistently better than most colors. After looking at several samples, the color chosen was the PMS 477. Several printers felt that a process cyan should be used since they have it on the presses most of the time. But, we rarely print a process cyan in large solids, and most cyans do not give the printer much trouble.

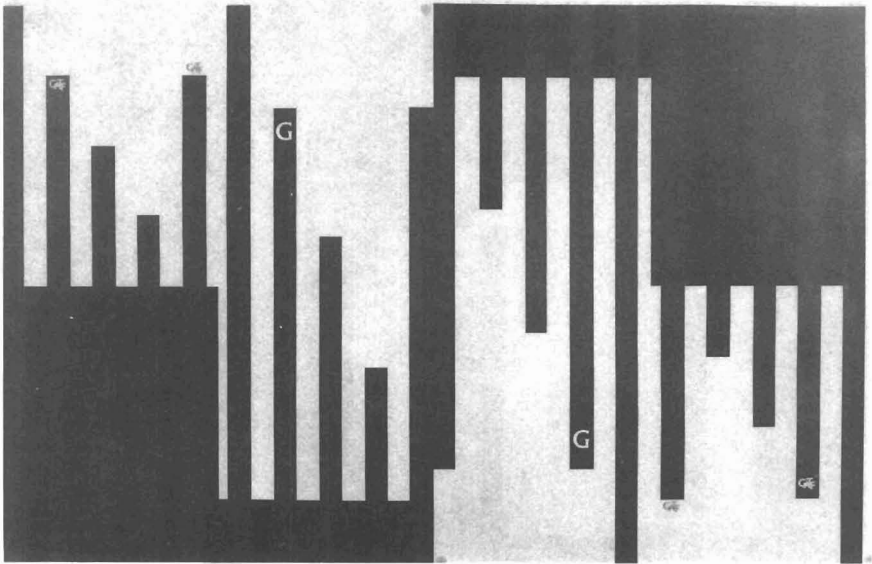


Figure 3. 1986 Mechanical Ghosting Form

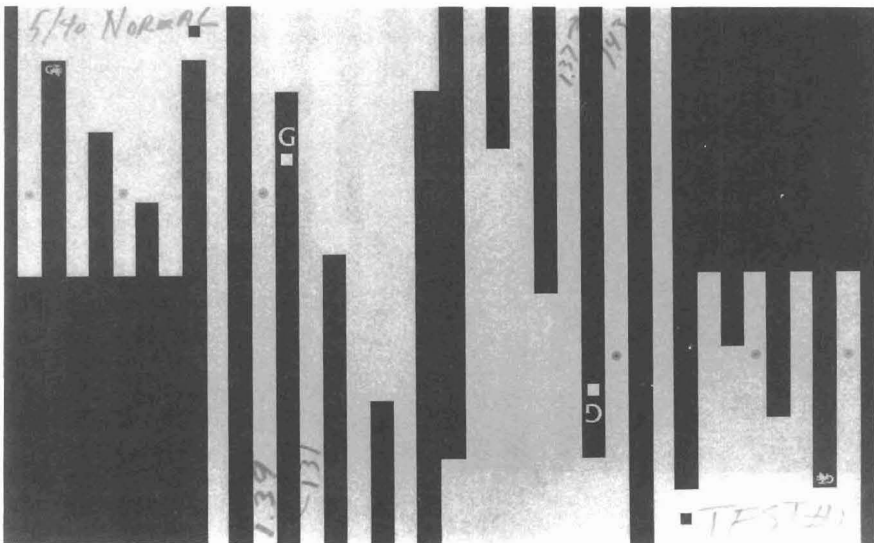
Figure 3 is a 1986 version of the mechanical ghosting form, which had been modified to make the test more severe. During this phase of the testing, a large number of different ink colors were tried. At the same time, a survey was conducted among pressmen doing high-quality work to determine which inks caused the most trouble. Reflex blue was cited the most problematic of ink colors. However, certain brands of reflex blue tested excellent, while other brands did rather poorly in terms of mechanical ghosting. The results show a significant difference between what some inkmakers call "imitation" versus "regular" reflex blue.

How Good is Good?

Obviously, this answer depends on what level of quality you are trying to reach in your plant. Today's industry has higher quality demands and higher consumer expectations, so many customers will no longer accept any ghosting

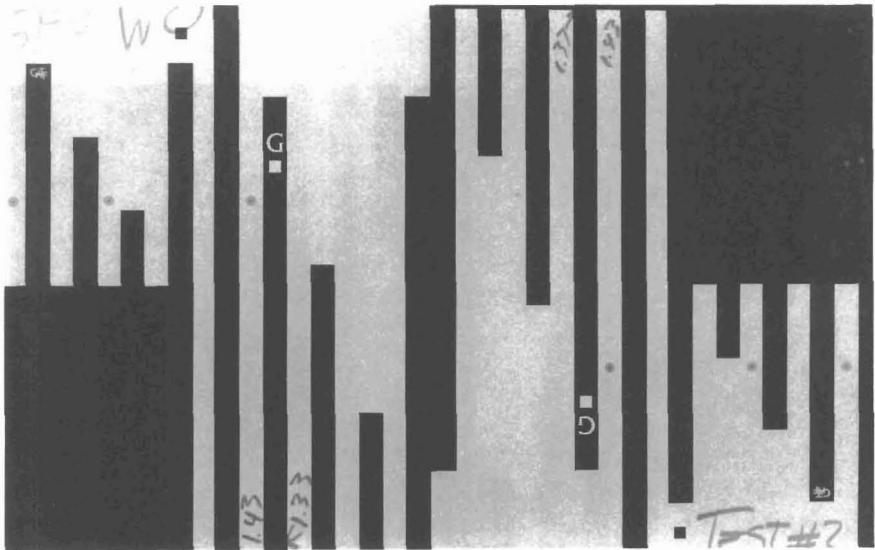
at all. The form can be evaluated visually and/or with a densitometer. Very large ghosts (up to a density difference of .20) can be seen in some printing systems. Likewise, some printing systems have had no density differences when checked visually and when using the densitometer. If an average exists (without extensive monies being spent on the press) the average is likely to be around .04 at the 3/4 area take-off bar on the form.

For a point of reference, many commercial printers normally consider a density difference of .02 acceptable in a solid area.



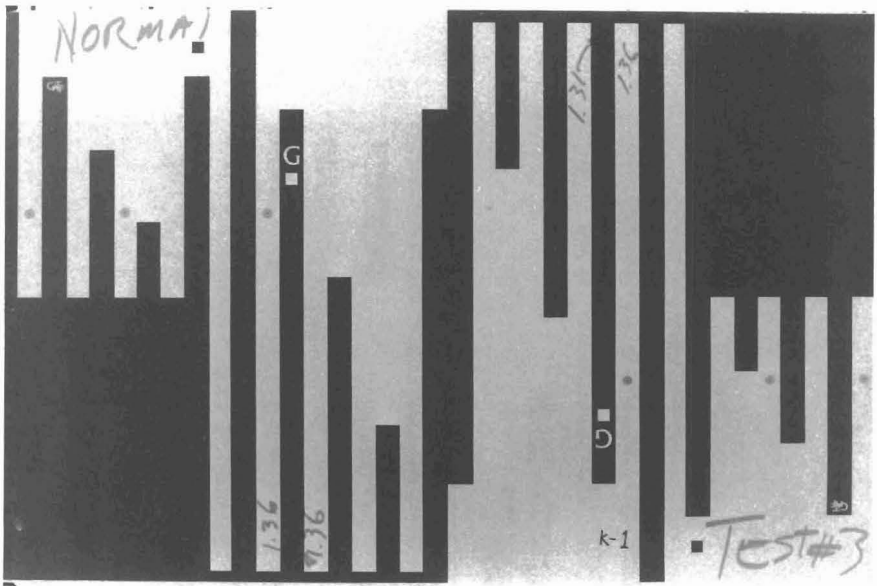
Test #1

Test #1 was the first in a series of tests conducted at a printer on two different brands of presses. The first press tested was an older five-color 40-in. that revealed some interesting information. This illustration shows the gripper edge with a .08 density difference while the trailing edge has only a .06 density difference. This is rather unusual, since most pressmen are taught to place the ghosting portion of the job as near to the gripper as possible.



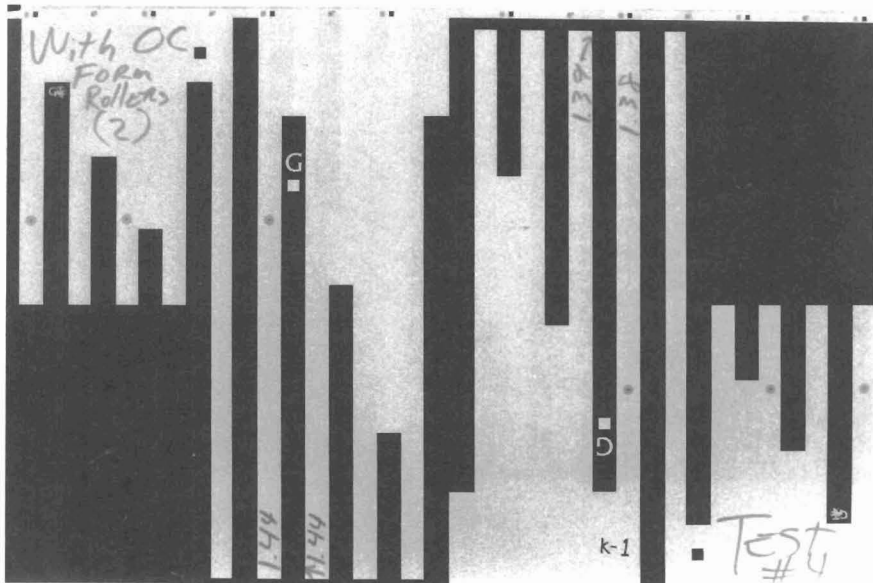
Test #2

Test #2, with only slight oscillation of the form rollers, shows a 0.10 difference at the lead edge and only a 0.06 difference at the trailing edge.



Test #3

Test #3 involved a new press. At the lead edge, there was no difference in density at the 3/4 bar point, while at the trailing edge, there was approximately a 0.05 difference.



Test #4

In Test #4, the same press was equipped with two oscillating form rollers, and the test showed no ghosting at the lead edge. At the trailing edge, there was only a 0.01 difference in the bar with no visually noticeable ghost.

It should be pointed out that tests have been conducted on presses that showed no ghosting when examined visually and using densitometers.

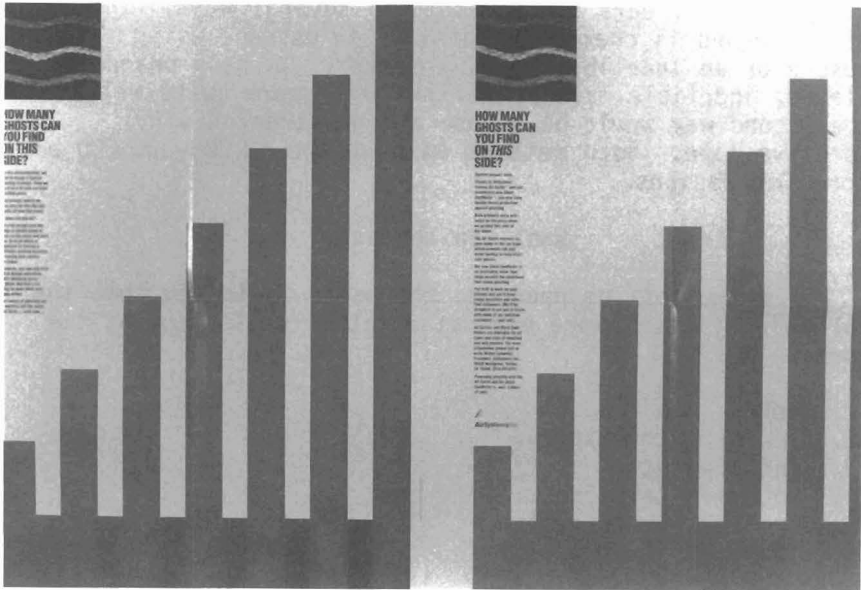


Figure 4. Air Systems Form

Figure 4 shows the Air Systems, Inc. form, which has been used in many plants.

Special Cures: Heatset Web Offset

Several web printers have begun using a technique to eliminate or reduce mechanical ghosting on web offset forms. The problem occurred primarily on magazine covers, which have a 1/2" or 3/8" surround of a process color illustration. Since there is no room for take-off bars nor many other measures, they began using an 85% 133-line straight line tint at a 45° angle across-the-cylinder, instead of a "solid." The lead edge would be run at 45° and the trailing edge of the same magazine cover would run at 90° opposite. Using this method, water will not become trapped on the form as easily. On a magazine, the ghosting line would still be visible; however, it will appear dramatically diminished when held at normal reading distance.

Adding Take-Off Bars on Press

Take-off bars can be added in several ways. The first method is chemical addition, in essence using a tusche or an indelible laundry marker. On many brands of plates, indelible laundry markers will work quite well. The second way would be to use a high-strength vinyl adhesive tape. Both methods will endure 50,000-100,000 or more impressions.

What Can We Test?

In the testing program, the users indicated that the following factors were evaluated rather well by using the form:

1. Ink
2. Ink film thickness
3. Ink pigment
4. Fountain solution
5. Overall inking system
6. Dampening system

During the testing program, variations were made on all of the above to see if the form would be sensitive enough to detect the significance of the changes.

Mechanical ghosting occurs when the press cannot print a uniform ink film on jobs with nonuniform ink coverage. The following suggestions can help to reduce mechanical ghosting:

1. Use opaque inks wherever possible.
2. Run a thicker ink film and increase to the maximum allowable density for acceptable printing.
3. Reduce ink strength and run more ink or else change to a weaker ink. A high solid ink with good transfer properties would be desirable.
4. Print an oversized paper with heavy solids and trim areas to reduce ink on the form rollers where coverage is light.

5. Rotate the print or print on an angle. This is best done when you have a system for creating masks electronically.
6. Run with the minimum amount of fountain solution needed to keep the plates clean.
7. Increase the pitch of the vibrator rollers for maximum side-to-side movement.
8. Use compressible blankets.
9. Use a less absorptive paper with better ink hold-out.
10. If running with bareback dampening, switch to cloth-sleeved or paper-covered rollers.
11. Run the job on a different press.
12. Check all ink rollers and blankets. Be sure that there is no glazing or low spots, that durometers are proper, and pressures are set per manufacturer's specifications.
13. Put heavy coverage, most likely the show ghost, near the gripper or trailing edge. The area that you put it in depends on your particular press; i.e., some presses show less ghosting at the gripper, others show more at the gripper.
14. Consider using antighosting oscillating form rollers, rider rollers, or rider dampening rollers.
15. Consider angling the take-off bars. Angling helps to break the harsh line.
16. Turn form and grip from the opposite edge.
17. Reposition elements within the form.
18. Underprint a screen.
19. Increase roller size if possible.
20. Check to make sure that all ink form rollers and ink bridge rollers are in place.

Thank-You's

A special thank you is extended to the following firms for their cooperation in the development of this test form:

Frederic Printing, Denver, CO
Hennegan Company, Cincinnati, OH
Rexham Corporation, Charlotte, NC
State Printing Company, Columbia, SC
Stevenson Photo Color, Cincinnati, OH
Williamson Printing Corporation, Dallas, TX

Selected Bibliography

-
1981. "The Frequent Problem of Ghosting," Australian Printer, Vol. 32, No. 3, p. 19.
-
1984. "Tough Test," Graphic Arts Monthly, June.
-
1986. "Ghosting," (S.D. Warren Company), Bulletin No. 1, 16 pp.
- Guerrette, D. J.
1985. "A Steady State Inking System Model for Predicting Ink Film Thickness Distribution," TAGA Proceedings, pp. 404-425.
- Hendler, Adolph
1980. "Mechanical Ghosting Problems and Solutions, Part 1," Australian Printer, May, pp. 4-10.
1980. "Mechanical Ghosting Problems and Solutions, Part 2," Australian Printer, June, pp. 21-28.
- Hull, Harry H.
1972. "Controlling Ink Distribution in Lithography and Letterpress," (Graphic Arts Technical Foundation), Research Progress Report Number 95, 8 pp.