

Test Targets Showcase: The Common Elements

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Objectives

The R•I•T Print test forms have been built based on some common features. There is a header with a title and subtitle, a target and production information. In addition, there are color bars and registration targets. This article explains the common purpose of these targets and why they have been used in all test form. The main purpose is to analyze the factors influencing the printing process, a series of test elements is often printed along with the image. Each element is designed to analyze a particular aspect of the printing process. While some of these test targets can be evaluated by eye, others require the use of measuring equipment. The usual form of these test elements is a strip across the edge of the press sheet.

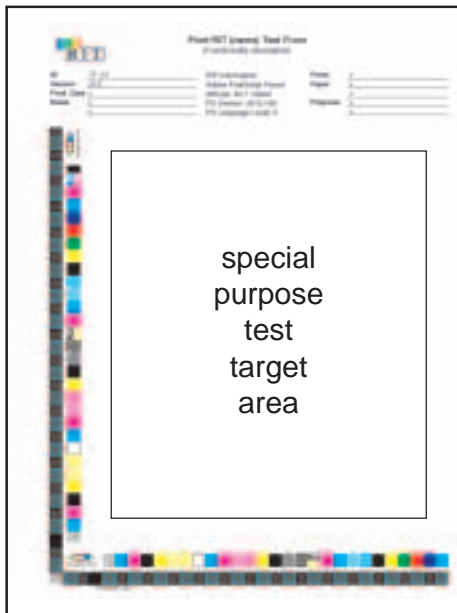


Figure 1. 'L Shape' color bars on the test form.

Common Purpose Test Targets

All test forms have two sets of color bars placed in the X and Y direction (L shape). There are two color bars: Print R•I•T Bar (P4BAR02U.EPS) and Print R•I•T Gray Bar (GCRBAR2U.EPS). These color bars were specifically designed for these test forms using modular elements. They are not necessarily optimized for production press work. Other color bars are available for these applications.

1. The Print R•I•T Color Bar

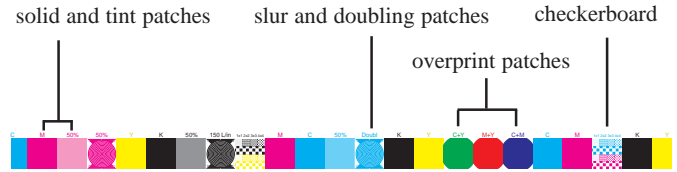


Figure 2. Print R•I•T Color Bar.

The R•I•T Color Bar enables the user to monitor ink density, tint density (total dot gain), directional dot gain, wet trapping and checker boards to test resolution. One important variable is the uniformity of inking within the press sheets. Solids are used to test the uniformity. Therefore several solids are needed for each color in X and Y direction. (figure 2)

Dot gain normally does not change very much across the press sheet, and therefore it is enough to have one or two locations for the 50% tint patches. Total dot gain is measured using the Murray-Davies equation which needs a solid density and tint density as parameters (figure 3).

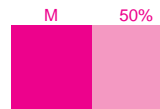


Figure 3. Solid and tint patches.

Directional dot gain can be observed by using the circular slur and doubling patches. If there is no directional dot gain, the circular pattern has a uniform density (figure 4a). If there is doubling or slur, then there will be light and dark segments in the circular pattern (figure 4b).



Figure 4a. Slur and doubling circle.



Figure 4b. Simulated directional dot gain.

Wet trapping can be evaluated by measuring two color overprint patches (figure 5). Ink trapping is mainly affected by the tack of the inks and the degree of dryness of the first down ink layer.



Figure 5. Overprint patches for trapping.

Checkerboards are visual test target to evaluate resolution of the imaging device (figure 6). There are 1x1, 2x2, 3x3 and 4x4 spot checkers plus a 50% reference tint. This target is very sensitive to changes in exposure, and therefore is used to verify that the printing plate was made according to specifications. Even if these checkers can be resolved on a plate, they may not be resolved on the printed sheet.



Figure 6. The checkerboard patterns.

2. The Gray Bar



Figure 7. Print R•I•T Gray Bar.

The most immediate need for press color control is uniformity and accuracy of inking. If all inks are low or high then this is less of a problem than if only one ink is low or high. A gray bar shows color balance. There are two types of alternating patches: one patch which is only an 80% black tint, and the other patch which is a 3 color gray using 75% cyan, 62% magenta and 60% yellow. The dot areas of these patches were chosen because, when printed under standardized conditions, they will form a neutral gray of the same darkness. If the patches do not print gray, then the color imbalance can very easily be visually evaluated. Although its major use is visual, the gray bar can be measured to get quantitative data. If there is an imbalance, then it may be necessary to also verify directional dot gain.

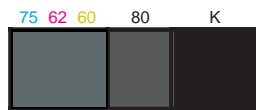


Figure 8. Solid, 80% tint, and gray patches.

Although color balance is a very important quality aspect of printing, additional parameters need to be checked. Even of the three color gray tint is neutral and matches the black reference tint, it could be too light or too dark. Therefore a solid black patch was added to the bar to permit densitometric control for black and visual control for the colors.

3. Registration Target

Press operators need a quick way to verify registration. Normal registration crosses work well, but a magnifier is needed for evaluation. The RIT Traffic Light Registration Scale (figure 9a) can be visually evaluated. It indicates register of the colors relative to black. Because the black holes and the colored circles have the same size, the slightest misregister will cause a moon shaped white area on one side of the circle (figure 9b).



Figure 9a. Traffic Light Register marks in registration.



Figure 9b. Traffic Light Register marks out of registration by simulation.

Summary

The common elements on these test forms make it possible to verify the conditions under which the test forms were printed. Evaluation can take place visually and/or densitometrically. Some of the characteristics that can be evaluated are:

- Hue and densities of printed inks
- Uniformity of inking across the sheet
- Dot gain or loss
- Directional dot gain such as doubling or slur
- Trapping
- Registration

Print•RIT Test Forms used in this study:

