

Inspecting the Goods

A thorough, properly performed inspection process can eliminate costly errors from turning up on press — or later.

by James R. Kadlec

Inspect or reject. It is impossible to understate the importance of thoroughness when it comes to inspecting final plate negatives. Virtually all errors people make can be caught through proofing and a comprehensive inspection process.

Proofing is the most important initial step of printing and inspection. One missing or misspelled word can, and usually will, require an expensive rerun. Therefore, when I proofread a paragraph, I not only read it verbatim, but backwards, too. Starting with the last word and comparing the text allows the proofreader an accurate method of verifying that all words are there and that the spelling is correct. It also reduces the likelihood of a proofreader “reading into” how the copy is “supposed” to read, thus ignoring missing text or a typo. While not appropriate for text-intensive jobs, this procedure works well in the label and packaging industries, because of the small amounts of text and nominal extra time required to do it right.

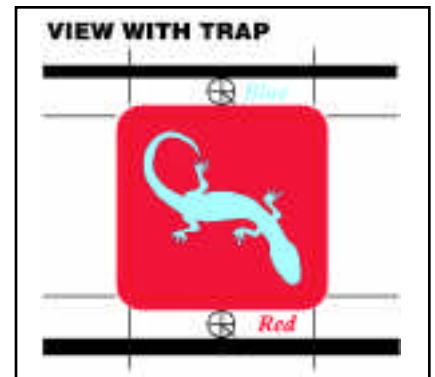
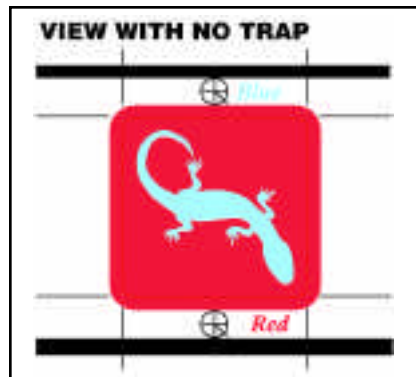


Figure 1: the importance of checking trap. The image to the left is trapped poorly — notice the gap between the gecko and the background color. The image to the right is trapped properly.

Tools for Measurement

There are a number of tools necessary to getting the proofing job done correctly. Here are the essentials:

- machinist's hundred scale;
- metal T-square;
- metal triangle;
- 7-mil film-positive grid;
- 10x magnifying glass;
- Para-Mag for checking tight register;
- a piece of transparent yellow overlay;
- a light table.

We all like to think that measuring a plate negative is simple, but since

the flexo plate negative needs to relate to a rotary die that has been engraved using C.N.C. milling, the measuring process must be equally as accurate. One way to ensure inaccurate results is to conduct such measuring with the notorious ruler (one who governs or a measuring stick). Machinists would never, not even in their wildest dreams, measure anything with a device as inaccurate as a ruler. The recommended choice is a machinist's hundred scale, because of its accuracy from scale to scale. An interesting test

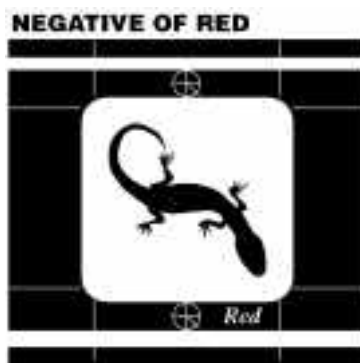


Figure 2: By viewing negatives one by one (left and center), it is difficult to gauge trap. Viewing both negatives with a transparent yellow overlay between them (right) allows for a simple, accurate method of checking of trap.

is to take two or three scales, butt them together, and see how accurately they align to each other. Now try this with rulers. Good luck: The scales will consistently relate to each other, but the rulers will almost never relate, especially plastic rulers.

A metal triangle and T-square, coupled with a light table, are used to check squareness. Alternatively, the film-positive grid can be used as a quick method to check squareness. I recommend using a piece of transparent yellow overlay to assist in seeing traps. *Figures 1 and 2*, on facing page, illustrate the trap-checking process.

For analog proofs, nothing helps more than a Dylux of the plate negative and a laser proof of the original copy. A Dylux of each color will allow the inspector to see a positive image of what each negative will produce. If the Dylux is laid on top of a negative of another color, the relationship between the two colors can be easily checked for fit (negative-to-negative comparison is the most accurate way of doing this), relationship of register marks to each color and color break (see *Figure 3*). This method is also used to verify the relationship of common negatives to each variable copy.

The proper handling of filmwork is just as important as the use of any tool. The most common causes of film damage result from a lack of

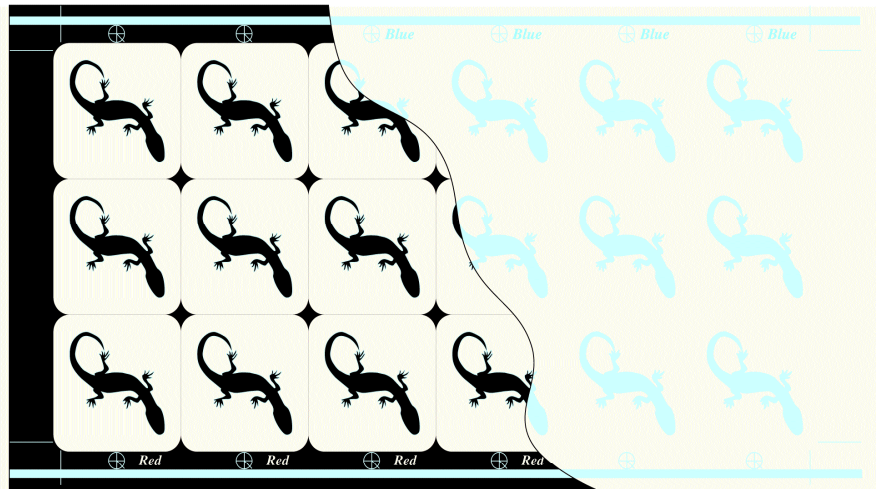


Figure 3: By placing a Dylux over a negative (in this case, the red negative), it becomes a relatively simple task to check the relationship of colors.

understanding that a small kink or scratch in a screen or image area will cause a defective plate to be made. Obviously, care must be taken when handling final film — or any film, for that matter. Precautions, such as inserting a sheet of corrugated cardboard into the transfer/storage envelope, will eliminate kinks resulting from inexperienced hands. Operators and inspectors beware: Allowing film to drape over your fingers, versus holding it gently in a vertical position, will focus the film's weight in one spot, causing a kink. Using 7-mil film reduces this potential hazard. Kinking also comes from picking up the film from anywhere but the edges. Scratching comes from the

film being in an environment with sharp objects, including paper clips. No paper clips or staples — period!

Getting the Numbers Right

Checking all the math on the order will ensure the correct distortion factor and that center-to-center stepping relates to the rotary tooling (size + gap = center-to-center). The distortion factor for 0.067" plate material can be checked simply by calculating the following formula: 0.389 (K Factor), divided by repeat, multiplied by 100, minus 100. (It should be noted that the K Factor will vary with plate thickness. See page 114 of the August 1998 issue of FLEXO® Magazine for a table of K Factor values.)

Assuming a repeat of 6.000", this is how the formula would be calculated:

- 0.389 divided by 6.000 = 0.065;
- 0.065 multiplied by 100 = 6.500;
- 6.500 minus 100 = minus-93.500.

The minus-93.500 obtained above translates to a 93.500% distortion for a 6" repeat (see *Figure 4*). The distortion factor can be then multiplied by the step around the cylinder to calculate the distorted step. For example, if we assume a step of 1.000, the formula would be calculated this way: 93.500% x 1.000 = 0.935. When there are more than two images around the cylinder, an additional for-

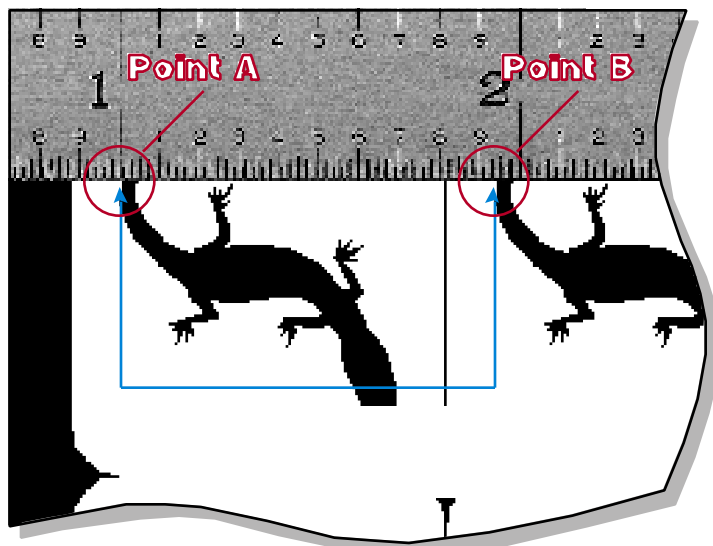


Figure 4: Measuring the distorted step with a machinist's hundred scale.

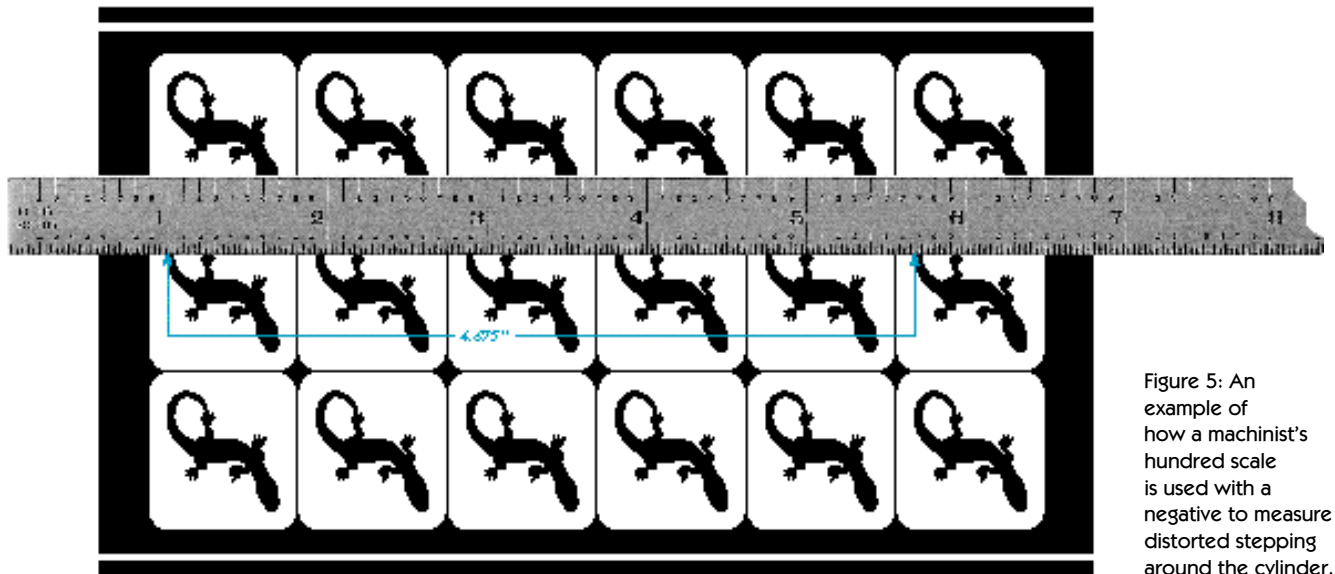


Figure 5: An example of how a machinist's hundred scale is used with a negative to measure distorted stepping around the cylinder.

mula should be used to double check the aggregate stepping to ensure all stepping is consistent and correctly done. This formula is simple: Take the number of steps around the cylinder, subtract one and multiply the result by the center-to-center around the cylinder (size + gap = center-to-center), then multiply that total by the distortion factor. This result allows a quick measurement that proves the distorted stepping around the cylinder is correct. Here's a sample application of the formula, again assuming a repeat of 6.000":

- 6.000" repeat divided by 6 (steps around) = 1.000 C-C around;
- 1.000" multiplied by 5 (6-1=5) = 5.000";
- 5.000" multiplied by 93.500% = 4.675".

The 4.675" result is the dimension for which the distorted step will be checked. Use the same formula without the distortion factor for checking the center-to-center across the web. The 4.675" dimension can be measured from point to point on the final plate negative, allowing for a measuring point and checking the accuracy of the aggregate step and repeat (see *Figure 5*). The best accuracy is obtained when using three decimal places in all math calculations related

Film-Inspection Check List

The cost to correct an error is directly proportional to the amount of time it takes to detect it. This increases the importance of the prepress inspection process. Following are 10 steps to ensuring that the inspection is executed properly.

- 1) Read the job order thoroughly.
- 2) Understand the order, as well as the number of colors and their respective color breaks. Review the laser proofs for content.
- 3) Make progressive proofs of the plate negatives. (Dylux is cheapest and fastest.)
- 4) Check color breaks and trapping using the Dylux proof; check against laser proofs for content.
- 5) Check bearers (verify web width) and register marks (as needed). Now is the best time to verify traps.
- 6) Do the math. Check stepping against the master die log or tooling order. Recalculate the distortion factor and the distorted step. Check the center-to-center across the web and the distorted center-to-center around the cylinder. Here's the formula:

$$0.389 \text{ K Factor, divided by repeat, multiplied by 100, minus 100.}$$
 Next, take the number of steps around the cylinder, subtract one and multiply the result by the center-to-center (size + gap = C-C) around the cylinder, then multiply that total by the distortion factor.
- 7) Verify that the negatives are right-reading emulsion up (RRE-UP) for correct printing on paper (emulsion down if mirror image is desired). Also check the density of the film to ensure it is at least 4.000 for platemaking. You should be unable to see through dark areas when a coin is placed between the light table and the negative.
- 8) Thoroughly review negatives for thin lines (usually smaller than half a point), and dot percentages smaller than 3%-5% (depending on how small a dot your plate material can hold).
- 9) Using a magnifying glass, look for spots of dirt embedded in the film that may cause a hole in the printing. (Films from imagesetters are usually much cleaner than conventionally stripped films).
- 10) Immediately prior to plating the film, review it for mishandling. Kinks and scratches will show up in the film — if in the image area, they may also print.

— James R. Kadlec

to stepping, as has been done throughout this article. Also, when measuring, start at the 1.000" dimension for a more definitive measurement.

The triangle is an extremely valuable tool for checking squareness of the stepping, especially when the negative was made using conventional production methods. The plate negative is aligned and taped down on a light table, using a T-square to ensure straightness. The triangle will now show if the film was crooked when it was stepped. If the negative was stepped crooked, it will have a stair-stepping pattern to it when checked in alignment with a T-square (see *Figure 6* on page 37). In the newer, electronic age of producing plate films, squareness usually is not an issue, but crooked stepping still happens, depending on the method by which the image was stepped within the computer.

Checking Registration and Trap

A bit of care is often all that is necessary to check film for proper crop and register marks, as well as trap (fit). All too often a stripper or electronics operator will fail to apply register marks, bearers and/or crop marks when producing final film. What good is a plate that not only cannot be mounted, but cannot even be registered with other colors? You must inspect the film to ensure it has marks that relate to each color. At the same time, verify that the bearer will not print on the impression cylinders. (Bearers should be narrower than web width. 1/8" is standard).

Transparent yellow overlay is primarily used to help the inspector see trapping and registration. The yellow color adds contrast to the white (clear) areas of the film, and allows reverses to show better. For multiple-colored jobs, you may want to try using Dyluxes made of the accompanying colors. Consider the example where blue and red plates trap to each other,

and the red is common with several blue plates. Short of pulling a composite proof of each blue and red negative to determine if they will relate when on press, the blue negative can be laid on a light table and a Dylux proof of the red negative can be placed over the blue negative to see and confirm the relationship between colors. Since light shines through the

film, the black-and-white laser proof can also be laid on top of the negative to help compare the type and illustrations. The film is distorted, but the laser will reflect exactly what copy and illustrations should exist, allowing a close visual comparison to be made. This practice can help in the detection of a missing part of a line of type, a missing logo or even where the

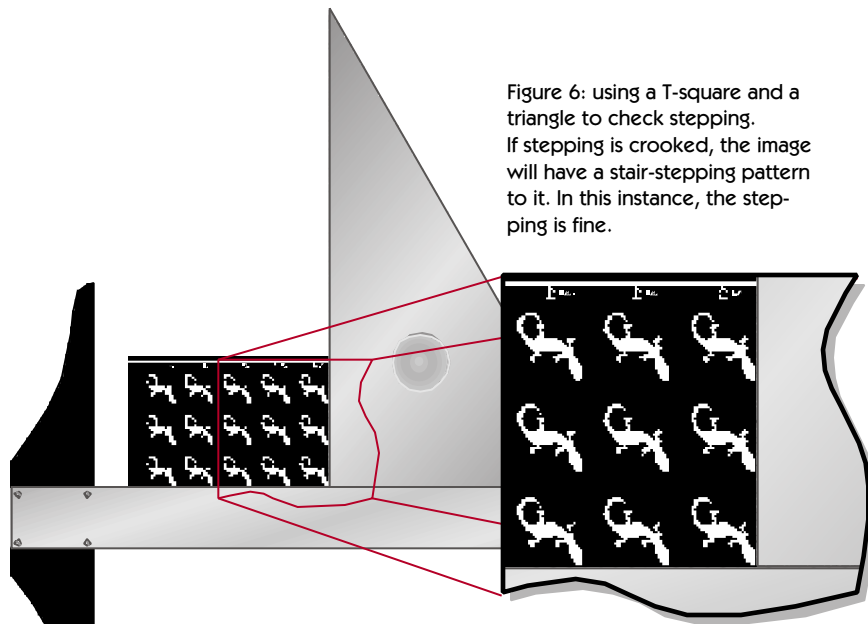



Figure 6: using a T-square and a triangle to check stepping. If stepping is crooked, the image will have a stair-stepping pattern to it. In this instance, the stepping is fine.

Courier type font replaces a missing font. How many times have we all missed these?

Despite all these mechanical methods of verifying plate nega-

tives, bad separations still make it to the presses. Why? In many cases, the lack of a final color proof is the culprit. A color key is a simple, fast and inexpensive

method to verify color flexo projects. It can be mounted in a manner that makes it readable. (Plate films would produce a mirror-image proof since the emulsion is up and right reading.) Granted, 95% of all film produced is correct; however, it is the last 5% that makes or breaks the profit.

Throughout all my experiences in printing, I have found that a few minutes of inspection time prevents the compounded expense and embarrassment of shipping a flawed product to your customer. My favorite quote hanging in a label shop is, "Great companies are led to success through the maniacal attention to detail." 

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