Guidelines for Scanning Techniques

Use this guideline as a reference when analyzing, scanning and adjusting images for high-resolution, quality output. This is not a step-by-step process and is not intended to be. Scanning is an art and should be performed by skilled operators that understand the printing process. For the highest quality have Thomson-Shore prepare your scans and provide them to you on CD, using our p-file process.

Analyzing Photos–The Tones

When receiving photos to scan you evaluate the tones. Is it too dark? Is it too light? A grayscale image can be broken down into the following parts.

- The Highlight– the light areas of a photo
- The Midtones– the gray areas, carries most of the detail
- The Shadows– the dark area in the image

There are also quarter tones and three-quarter tones. When evaluating a photo before being scanned, first you need to decide whether it needs any adjusting at all and if so what adjustments. How is the contrast? Is the highlight too dark, too light; midtones too dark, too light; shadows too dark, too light? Determine what adjustments are needed, as it may be necessary to adjust all or just certain tones.

Once a photo has been evaluated and if your scanner is able, it is best to adjust for tonal range when scanning. If additional fine tuning is needed, it can be done with image manipulation software, such as PhotoShop. If your scanner is unable to do adjustments on the fly, then make adjustments using a image manipulation software.

Dot Gain

Dot gain is what happens on press when printing halftones or flat screens. It is a natural part of the process and needs to be compensated for when preparing the scans. The paper absorbs ink causing the dots to expand. The adjustment for this should be done in the midtones through the three-quarter tones as well as setting the end dots.

Using different line screens can also help compensate for dot gain. Natural stocks are especially absorbant so a 133 line screen is typically used. A 150 line screen is used on white and coated stocks because a coarser 133 line screen would be more visible on the smoother sheets, and a smoother sheet is less absorbant.

Your printer should be able to advise you around dot gain compensation based on the paper you'll be using and the type of press your project will print on. We are able to accurately predict dot gain for our floor sheets because we use them daily. Custom order stocks are not as predictable as we may not have experience with how it reacts on press.

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End Dots

A grayscale image must be represented by dots, or halftone cells to reproduce on press. The darkest printed area of a halftone is the "shadow end;" the lightest area is the "highlight." Dot gain, paper, type of press and the desired contrast all need to be considered when determining end dots. Because there are so many factors to consider, it is difficult to give guidelines for setting end dots. However, here are our initial targets for our sheetfed ZP presses:

4% highlight - 90% shadow, for natural stocks
3% highlight - 93% shadow, for white stocks
2% highlight - 95% shadow, for coated/matte stocks.

Adjusting Curves

In Photoshop as well as other programs, images can be adjusted to lighten or darken them. Photoshop offers Levels and Curves for this function. Some programs offer auto adjustments, with this the end dots might change to 0% and 100% so auto is not always best.

When adjusting tones we choose to use Curves. This option is found in Photoshop under the Image menu/Adjust/Curves. When opening Curves you see a box with a start line also known as a linear line. When making adjustments to this line for your curves, you want to keep this as smooth as possible, not choppy as this causes posterizing. Posterization can be a neat effect, but only if that's what you intend. The line represents the tonal range in the photo. The bottom of the line is the highlight, the middle is the midtones, and the top is the shadow. When the line is moved the scan will change in appearance. Click on the line in the box and the % shows up in the input at the bottom of the box. Drag the line up or down or across and it will have a different % in output. You have just adjusted the scan.

Reference the info pallette for actual readings. It will tell you if 40 is changed to 30 and so on before the save. You can also use the eyedropper tool to determine what percentage the dot is in areas of the photo. Let's say the midtones are too dark and need to be lightened, click on the line at the 50% and move it down. If the midtones are too light, move the 50% up. For the shadows pull down to lighten; and pull across to darken. For highlights pull up to lighten and across to darken. Now you can adjust all three and more, there can be as many as 16 points that can be assigned to a curve.

Other Odds and Ends

Moiré patterns are an offensive pattern caused by two or more screens over the top of one another. A first generation halftone is typically printed at a 45 degree angle. If a printed piece is the only art available it is known as a rescreen. You would be able to see this screen with an eye-glass. Sometimes a pattern that exists in the photo can cause a moiré effect, a plaid shirt is an example of this.

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To avoid a moiré pattern there are a few things that can be done. One method to reduce moiré is using PhotoShop's Gaussian blur filter. Be careful not to use to much as it puts the image out of focus, the larger the number the more out of focus it is.

Another technique is to scan at 601 PPI and downsample it in PhotoShop to 300. If there is still a pattern use gaussian blur. Prints that have a textured paper showing in the scan can sometimes be improved using gaussian or a few other filters.

Converting Color Photos

When converting scans that are color to grayscale, be aware that some tones may fade away, which can cause detail loss. Depending on the color of the laser in the scanner, that same color in the scan may fade or dropout. If the laser is red it will drop the color red or at minimum lighten it. Some scanners have a panchromatic filter to help correct this. Panchromatic filters are sensitive to all colors.

Standards for Scanning Resolution

Grayscale images: 2 times the line screen
150 line = 300 ppi
133 line = 266 ppi
Lowest we can use without pixelization 225 ppi

Line art images: Minimum 600 ppi, which will be slightly jaggy
Suggested 1200 ppi
Some fine detail may require 2400 ppi
(Be careful not to downsample these if providing PDF)

Scanning Ratios

It is best to scan the image at the percentage it will be used in the document. Some scanners will not allow you to adjust the size at the time of scanning. Using this formula will help determine scanning resolution if the image will be scaled after it is placed in the page layout. This is especially important if you intend to enlarge the image, as enlarging will decrease the resolution, resulting in poor quality. Reductions will increase resolution, so scanning at a lower resolution and then scaling the image down will allow for good quality, but saves processing time.

(Desired line screen x 2) x scale factor = scanning resolution
An example of a scan to be enlarged after scanning
(133 X 2) x 140% = 373 ppi
An example of a scan to be reduced after scanning
(133 x 2) x 40% = 105 ppi

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<u>Recommended Reading</u>

Real World Scanning and Halftones / Peachpit Press
Fundamental Photoshop / Osborne Mc Graw Hill
Adobe Photoshop User Guide

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