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# White paper

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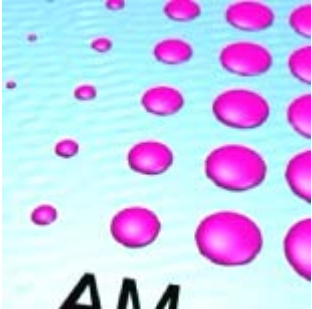
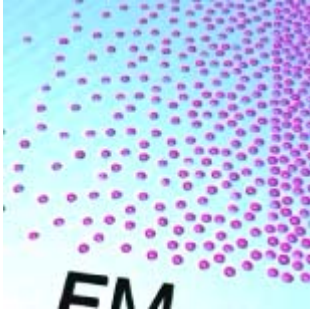
## Staccato Best Practices for Newspaper and Commercial Coldset Presses

This document provides best practices for printing successfully with Staccato and newspaper and commercial coldset presses. Specifically, it provides guidelines for:

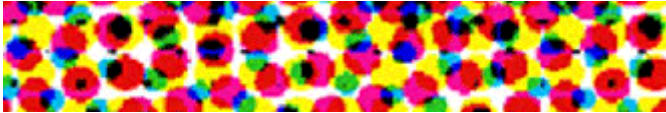
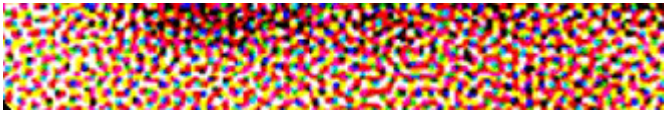


- Developing a stable prepress and pressroom environment
- Implementing process controls that track and maintain both prepress and pressroom variables
- Characterizing your stable AM presswork and using it as a target to build tonal compensation curves for Staccato

### Comparison of AM Screening with Staccato Screening

Overall, there are a number of advantages to printing with Staccato screening: fewer registration issues, better dot gain control, greater tonal range and no moiré issues. As well as these, the overall print quality is better with greater detail rendition and more consistent printing. The following table explains the differences between Staccato and AM screening and what makes Staccato better.

AM Screening/ XM Screening (Hybrid AM)	Stochastic (FM) Screening
<p><b>Dot size</b></p> <p>Amplitude-modulated dots are constant in number. The image is darkened or lightened by making the size of the dot either larger or smaller.</p> 	<p>Frequency modulated dots are very small and the size stays the same throughout the tone scale. The image is darkened by adding more small dots and lightened by removing them.</p> 



AM Screening/ XM Screening (Hybrid AM)	Stochastic (FM) Screening
<p><b>Highlights</b></p> <p>Conventional AM screens produce dots in the extreme highlights at device resolution (1200 dpi = 21.2 microns, for example). Hybrid AM screens produce larger dots in the extreme highlights, randomly distributed but constrained to the AM grid. This constraint can produce visible non-uniformities and visible transitions from the Hybrid extreme highlights to the AM highlights.</p>	<p>Staccato screens can be chosen to reflect the size of desired highlight dots (Staccato 25 = 21.2 microns, Staccato 36 = 31.8, Staccato 40 = 42.4). In contrast to the highlights with Hybrid AM screens, Staccato dots are not constrained and are distributed in a more visibly uniform way.</p>
<p><b>Artifacts</b></p> <p>Dots are set up in a grid pattern with different angles for each color. The interaction of the four primary colors, at their specific angle, forms a dot structure known as a rosette. This rosette pattern can be the source of many artifacts such as screening and subject moiré.</p> 	<p>Staccato FM screening places dots in a pseudo-random way instead of aligning them along fixed screen angles. There is no rosette structure and subject moiré is eliminated by the absence of a fixed direction of the FM microdots. Screening moiré is also eliminated by the absence of a fixed direction or spacing of the FM microdots.</p> 
<p><b>Color Fidelity</b></p> <p>Coarser line-screened images have less color fidelity than higher screened images. The spacing between dots is larger and the light, reflected off the substrate, is increased, contaminating the colors. On lower grade paper, the impact is more severe. The overall result from this condition is muddier flatter images and a smaller color gamut.</p>	<p>The dots are much finer with less area between them to reflect light from the substrate. As a result, more light is filtered through the ink with less substrate contamination delivering a larger color gamut throughout the entire tonal range.</p>
<p><b>On-press Stability</b></p> <p>Small highlight dots cannot hold as thick an ink film as larger dots. Therefore, as density increases, more ink tends to accumulate in the midtones and shadows. The press operator must choose to control highlight or midtone ink films. Any subsequent density variations through the press run will cause color shifts throughout the tone scale where larger dots dominate.</p> 	<p>Staccato's microdot structures carry a thin ink film through most of the tonal range, substantially reducing the variation in mechanical gain common to AM dots. The result is more consistent tonal reproduction with less gain variation. Press operators will find that color control on press is different than AM because increasing density causes ink to accumulate in shadow and solids and not as much in the midtones.</p> 



AM Screening/ XM Screening (Hybrid AM)	Stochastic (FM) Screening
<p><b>Registration</b></p> <p>Good image quality requires good registration. Ink dots of each process color are laid down in fixed positions to create an orderly pattern called a rosette. Registration on press is critical to keeping the rosette properly formed and image detail optimal. A very small level of misregistration degrades the overall quality of the image, resulting in rejected copies.</p>	<p>With Staccato screening, the dots are pseudo random. As a result, there is no discernible pattern to disrupt. Copy can be out of register with less impact on quality. This helps speed up makeready, since fewer copies are required before exact register is reached. Throughout the run the drifting of register across the web and throughout the run will be less noticeable resulting in more consistent quality, increased yields, and less waste.</p>
<p><b>Color Variation</b></p> <p>Color variation can be caused by several factors. One factor is the interaction of the four primary colors, at their specific angle, to form the dot structure known as a rosette. As registration changes and colors misalign within the rosette, color shifts can occur. Density fluctuations, which are normal during the course of a press run, can also cause color variation—the visual effect of density variation is greater on the larger dots, which carry more ink, than on the smaller dots.</p>	<p>The absence of screen angles with Staccato eliminates halftone artifacts such as rosettes. If misregistration causes the dots from one ink to shift in relationship to the other inks' dots, the effect on color is minimal. The smaller dots of Staccato are limited in the amount of ink they can carry, allowing for better stability as density fluctuates during the press run.</p>

## Stable Printing Environment and Staccato

Stability, simply put, means process changes are not required (densities, curves) for different jobs.

Many variables contribute to the variation that occurs in daily operation. Tracking and maintaining density and tonal value increase (dot gain), on a regular basis, will minimize daily variation. Printing to established ink densities helps stabilize lithographic behavior and create an effective platform for tonal calibration. Measuring and controlling dot gain helps track color shifts and gray balance, and provides further insight into lithographic behavior and press maintenance.

Any challenges and instabilities that exist with AM in newspaper presswork are exacerbated with finer AM, XM, and FM screens. Therefore, stable and satisfactory AM screening is necessary for a successful implementation of Staccato. Stabilizing your AM output, will smooth system integration, identify issues up front, and provide backup if there are issues with the finer screens.

Your stable AM screening provides a benchmark for densities and tonality—it should be measured and characterized as a target for Staccato presswork.



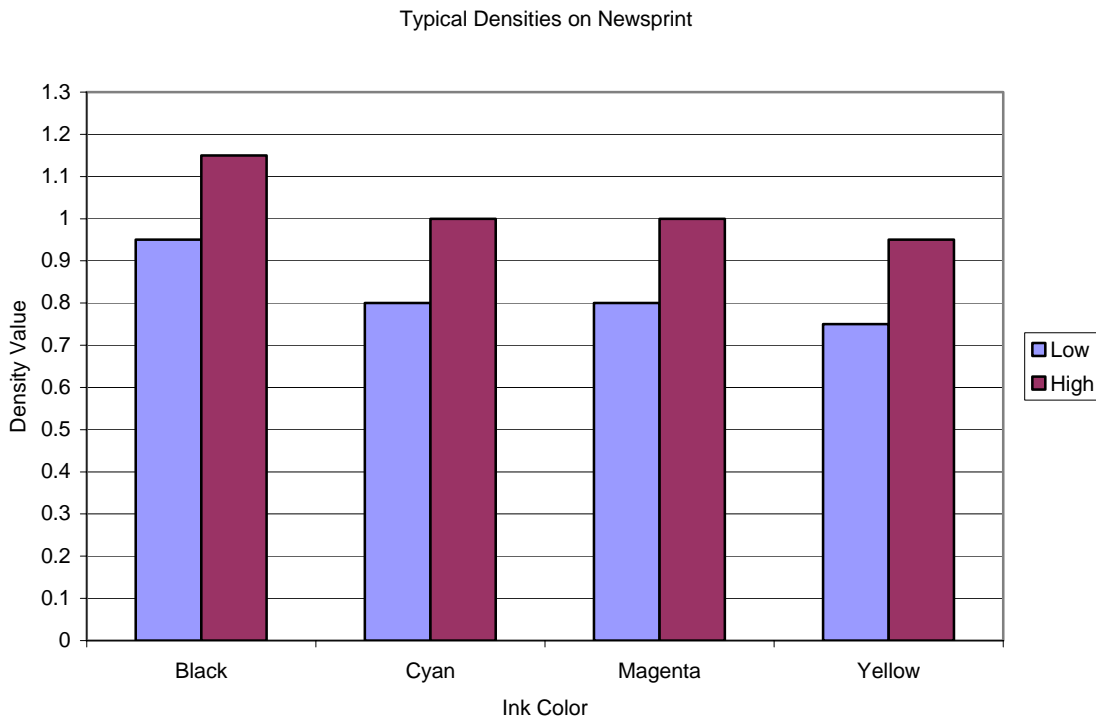
## Density

Contrast is primarily affected by inking and transfer pressures, assuming that you begin with properly imaged plates and a regularly maintained press that is operating to established standards. When you increase the inking, there is an accompanying increase in the ink film thickness or density and the relative print contrast as well. However, this increase in ink feed is desirable only up to a certain threshold. Should the ink film thickness be increased further, excessive dot gain may reduce print contrast by filling in the shadows and three-quarter-tone dots.

Ideally your solids are printed to an established ink density and the screens print open through the entire tone scale with good print contrast. Establish house standards for solid ink density by following the ink supplier's recommendations or by choosing an industry standard such as ISO, SNAP, or SWOP.

Using a solid ink density that is too low will result in an uneven ink film, increasing the potential for emulsification, reducing the color space of the press and giving text and solids a washed out appearance. Using ink densities that are too high may result in an unstable printing condition, low print contrast, plugging of shadows, and poor ink drying with rub and setoff issues.

The following graph shows a range of typical densities measured with a status T, non-polarized instrument.





## Tone Value Increase (Dot Gain)

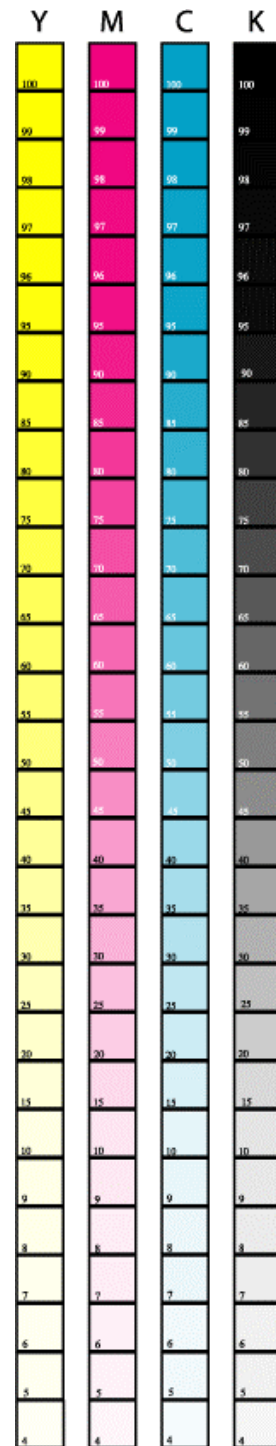
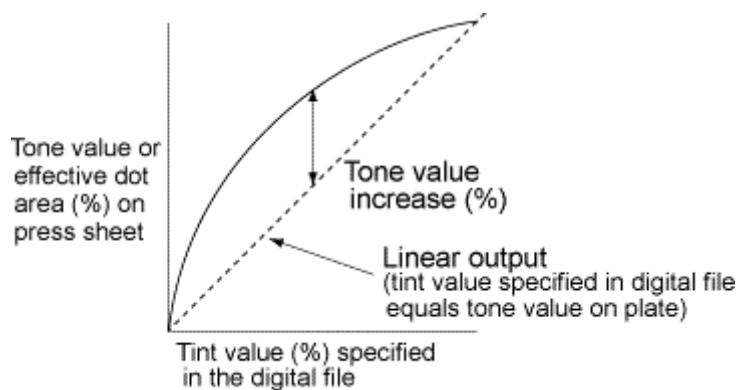
### What is Tonality?

Tonality in printing is the progression of tints from blank paper to solid ink for each color in a printing job. You can determine tonality by measuring a series of tint patches—ranging from the highlights to the shadows—on your output. The tonal value of a tint patch is a measurement of the percentage of light reflected. For example, blank paper is a zero percent tint (reflects back most of the light) and a solid ink patch is a 100 percent tint (reflects less light the higher the density).

### What is Tone Value Increase?

Tone value increase happens in the process that converts a digital file to a visual tint rendered by ink on paper. Tone value increase is the absolute, not relative, increase in tonal value. For example, if a 50 percent tint specified in the file produces a 79 percent tonal value (effective dot area) on the press sheet, the overall tone value increase (dot gain) is 29 percent.

The graphical relationship between the tint values specified in the digital file and tonal values or effective dot area on the press sheet is called the print characteristic. This figure shows the relationship:

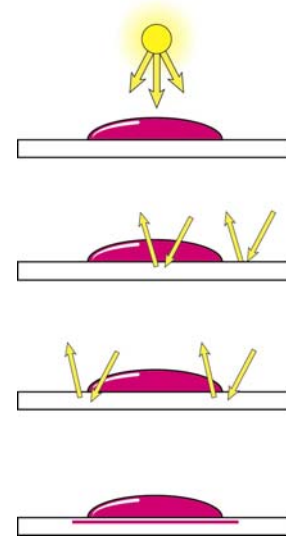


Two types of gain cause tone value increase: physical dot gain and optical dot gain.

Physical dot gain is physical dot growth. Factors that affect dot growth are plate exposures and printing conditions such as ink amount, ink tack and water balance, ink temperature, blanket, plate and impression cylinder pressures, plate types, blanket types, and paper types.

Optical dot gain is caused by the absorption and scattering of light in the paper and through the ink. More light is absorbed than reflected making the tone darker and the dot measure larger than its physical size. Tonal values are between 10 percent and 15 percent darker than AM screens.

Tonal compensation, is necessary to align Staccato tonality to typical newspaper standards.



**Optical Dot Gain**

## Using Tonal Compensation Curves to Control Tone Value Increase

A common challenge that printers face is the need to compensate for the differences in tonal value increase between presses, papers, screens and print conditions. Newspaper is particularly challenging, because tonal response and density, which are dependant on content and layout, can fluctuate considerably from job to job, making it difficult to characterize presswork on a single sheet.

Adjusting compensation curves, by eye, when printing with high lpi screens or Staccato is not good practice. Without methods to measure and compensate for the differences in higher-fidelity screens, curves often end up off-target, causing inconsistent printing and unnecessary corrective work on press.

First establish and print to an in-house or industry density standard. Then measure, determine and characterize the relative tonal values of each press, paper or halftone screen. Once the tonal values are known, build compensation curves that align different outputs to have the same tonal values and densities.

Tonal compensation does not remove dot gain from the printing process; instead it makes it possible to calibrate out excessive gain by adjusting the size or number of dots during conversion of the electronic image to a 1-bit screened image.

Details on building tonal compensation curves is provided in the section that follows prepress and press controls.



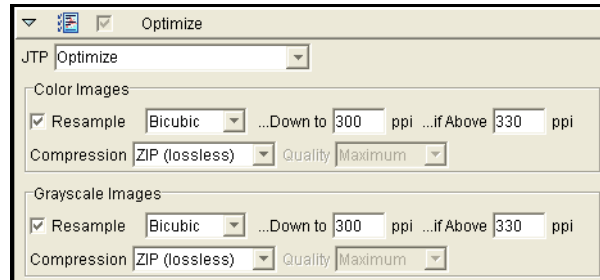
## Best Practices for Prepress

These guidelines are aimed at creating the conditions in prepress that will maximize print quality using Staccato. As with any improvements to quality, speed, or efficiency, success with Staccato requires processes that are standardized, stable and in control.

### Image Preparation

The following guidelines for scanning and preparing images will enhance image quality with Staccato printing:

- Scan images or have original images supplied at a resolution of 300 dpi. Low-resolution images, which were acceptable for coarse AM screening, do not take full advantage of the detail rendering capabilities of Staccato screening and may show artifacts such as staircasing.
- Ensure that settings in Prinergy® or other workflow components do not allow downsampling of 300+ dpi images. (For example, under Optimize in the **Refine** portion of a process plan for Prinergy, do not set the **Down to** setting lower than 300 dpi for **Color Images** and **Grayscale images**.)



- Use lossless image compression algorithms such as G4, LZW or Zip. Because Staccato can render fine detail such as compression artifacts, avoid lossy image compression technologies such as JPEG. If it's necessary to use JPEG compression, restrict settings to ensure maximum image quality.

**Note: JPEG images should be compressed only once.** If an image is supplied as JPEG and needs editing, first save it as TIFF and then edit to avoid losing additional data.

- Use additional sharpening or USM for original images less than 300 dpi in resolution. Staccato 25 and 36 are substantially finer than AM 100 or 120 and render with greater detail. In a Staccato workflow you may find that boosting USM (Unsharp Masking) is beneficial even for those images that are 300 dpi because it can resolve fine unsharp masks.

When sharpening, use slightly coarser settings than AM. Fine settings can increase noise or graininess in the image. Test different settings to find what's optimal for your workflow situation.

- Leave images full range and do not clip or adjust to compensate for legacy press operation. Compressing the tonal range of images prior to applying tonal calibration may result in the further loss of shadow or highlight detail or an overall flattening of the image.



## Plates

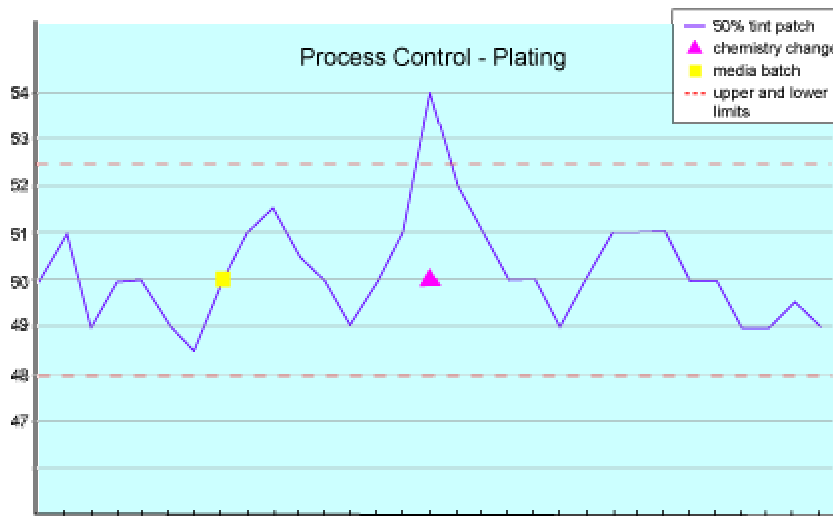
### Qualified Plate Media

Creo tests and qualifies plates for specific Staccato screens on all Creo CTP devices. Be sure to get your plate vendor involved and speak with your Creo representative about supported screens on your choice of media.

### Process Control for Plates

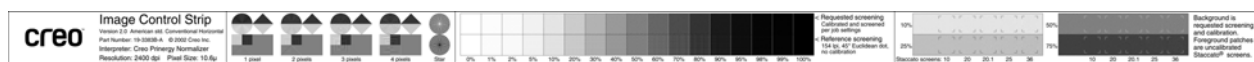
Creo undertakes exhaustive testing to qualify plates and categorize the exposure latitude for different screens and imaging speeds, including the exposure of Staccato screens. A qualified plate has enough exposure latitude to deliver day-to-day consistency, without visible artifacts and without significant change in dot area.

The expectation is that media vendors will continue to deliver plates and processing equipment that operate within the tolerances used during the qualification process. In reality, it makes sense to put quality control in place to monitor the consistency of supplied plates and the state of your chemistry on a regular basis. Process control will pay for itself by identifying problems before they cause extensive downtime and wasted materials during a crucial press run.



A process-control system that determines when variables are drifting out of tolerance is essential to the success of printing small dots.

Creo offers Image Control Strip to help monitor plate-processing quality for Staccato and AM screening.



Typically ICS doesn't fit in the bend of most newspaper plates, so another option is to make and monitor a test plate two times per shift.

Or consider making your own small tone patches and adding them to the plate layout.



## *Measuring Dot Area on Plate*

The best practice is to use a dot meter to measure dot area on plate. Compared to other instruments, they are consistent and more accurately represent the physical area of the dot on plate. Dot meters illuminate the medium and take a picture with a charge-coupled device (CCD) camera. The dot meter analyzes the resulting image to determine the physical dot area and screening characteristics of halftone dots, rather than the light-reflecting properties of the tint patch.

Creo recommends two dot reader instruments, the X-RiteDot™ and the GretagMacbeth iCPlate®. The iCPlate measures Staccato screens better throughout the tone scale. X-RiteDot measures Staccato screens well between 10% to 90% tone areas on plate.

In general, when using dot readers to read plates, you can expect a  $\pm 1\%$  difference in readings. For example, for a 50% target, dot readers may read between 49% or 51%. When using densitometers to read plates, you can expect a  $\pm 3\%$  variation in readings.

**Note:** Plate contrast between exposed and unexposed areas plays a role in measurement accuracy. For example, if you are measuring plates with good contrast, you get good accuracy. If you are measuring plates, which have a much lower contrast, the difference in readings with a dot reader can be more than 1%.

Regardless of the type of instrument you use, post-baking lowers the contrast of the plate, which makes readings less consistent. Creo recommends taking readings on the plate before post-baking.



## Best Practices for the Pressroom

Tell your consumable vendors that you will be printing with Staccato. You may want to reference the following table that shows how Staccato screening corresponds to AM screening at 1200 dpi.

Staccato screen at 1200 dpi	Highlight dot size	Highlight equivalent in terms of screen ruling (lpi)	Midtone FM cluster size	Midtone equivalent in terms of screen ruling (lpi)
Staccato 25	20 micron	1% dot at 120 lpi 1.5% @ 150 lpi	30 micron	325 lpi
Staccato 36*	30 micron	2.25% dot at 120 lpi 3% @ 133 lpi	43 micron	275 lpi
Staccato 40	40 micron	3.5% dot at 110 lpi	48 micron	250 lpi
Staccato 50	40 micron	3.5% dot at 110 lpi	64 micron	160 lpi
Staccato 70	60 micron	7.5% dot at 110 lpi or 4% dot at 80 lpi	80 micron	160 lpi

\*Staccato 36 is recommended with coldset or newspaper web press.

### Presses

Most newspapers print with screens between 85 lpi and 120 lpi. This range is generally not a limitation of the press, but rather a historical limitation in filmsetting and plate making. With film and analog plates, rendering small dots in the highlights and shadows was difficult, and the dots would get lost on press. As a result, printers reverted to coarser screens. With the Trendsetter<sup>®</sup> NEWS output device, even the smallest highlight dot (21.2 microns) is fully rendered on the plate and prints on most presses. This improvement paves the way for finer screens (133+ lpi) and Staccato.

A significant number of newspaper presses are capable of printing Staccato 36. Although, most newspaper printers do not have the experience with higher rulings, presses that can run 133 or 150 lpi screens can also run Staccato 36 or coarser. The same is true of older B2B (blanket-to-blanket, no bearers) webs able to run 133 or 150 lpi. Because these presses are able to run inks at 133 or 150 lpi, there's a good chance they will be able to run ink with Staccato 36 or coarser.

Older webs that can run 133 lpi screens can run Staccato 36 and coarser, and older webs than can run 150 lpi screens can run Staccato 25 and coarser. Older webs without an in-feed can also run Staccato 36, though in-feeds are important for web control and can reduce plate wear, web movement, and linting.

Poorly maintained coldset webs may have problems with Staccato screens and AM screens finer than 110 lpi. Dampening systems running bareback, with a durometer reading harder than the manufacturer's specification, may have difficulty running Staccato. Conventional dampening systems that are poorly maintained also create problems.

On newspaper webs, printing on paper with a recycled content of 75% or greater can be challenging because this paper carries a high amount of silica, which causes piling and plate blinding.



## **Fountain Solutions**

Ink and water balance is as critical with Staccato as it is with AM and XM screens. Before switching to Staccato screens, you should resolve any ink and water issues you have with your existing screens.

There are no set rules about fountain solutions and Staccato, except to use a good product that is recommended by your ink and plate manufacturer. As a rule of thumb, less is best. Where possible, use the minimum dosage of the fountain solution concentrate that the manufacturer recommends.

While Staccato microdots are less sensitive to physical dot gain from over-inking, they are more sensitive than larger AM dots to surrounding water levels and fountain conditions. Therefore, it is important to control pH, temperature, conductivity, and contamination in the dampening system.

The temperature of the fountain can be controlled in the dampening circulation system. Fountain temperature should be controlled within 5°C (10°F) of manufacturer's specification. On some presses, temperature can be further controlled in the press, using chilled rollers.

Buffered fountain solutions help to stabilize pH levels; however, pH can be measured periodically to ensure that it stays within the manufacturer's specifications. Processed water is recommended to further stabilize conductivity and pH. Check with your supplier to find a water treatment system suited to your printing needs.

A certain level of ink contamination in the dampening system may be unavoidable. However, excessive contamination is a good indicator of other issues. In fact, it may first be noticed in your presswork as all-color rain, or water streaking.

Back trap piling in the non-image area of the plate or blanket is generally caused by either excessive ink in the dampening system, low conductivity, or non-image area that is not desensitized (it attracts ink instead of repelling it with water).

## **Blankets and Paper**

Blanket performance plays a significant role when printing with Staccato. In general, Staccato performs well with buffed or ground surface compressible blankets that enable excellent transfer of the micron dot with good release characteristics.

Typically, blankets used in a newspaper environment are 4-ply no-pack. For a no-pack blanket, the print height must be capable of maintaining excellent transfer and smooth lay-down of the ink within the microdot structure. All other blanket types should be packed to manufacturers' specifications.

Formal pressroom process control practices are a great benefit to ensure consistently repeatable results:

- Measure and record blanket thickness with a Caddy gauge.
- Mount the blanket using a torque wrench.
- Measure print heights with a packing gauge.
- Establish criteria for blanket repacking or replacement.



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## **Ink Compatible With Staccato Screening**

Before switching from AM to Staccato 36 resolve any AM ink issues. You should have stable print conditions with inks that flow well with 133 line AM screens. Good transfer and laydown of the ink is important to enable uniform density within the dot structure of the microdots. Check with your ink vendor to see what options are available.

Here are some practical guidelines for selecting inks:

- Progressive-tack as opposed to common-tack inks. Generally the tack values or sequence used with AM settings are the same for Staccato.
- Low-viscosity, high-flow inks. Low viscosity helps ink shear and transfer to the sheet. For heat-set webs, chilled or water-cooled oscillators keep roller temperatures constant and maintain ink viscosity and performance at ideal levels.

High-pigment, low-gain inks are problematic with fine lpi AM/XM and Staccato screening because they have a propensity to pile and print inconsistently

- Lower levels of water and just enough ink to achieve desired densities. Use water levels rather than ink density to control Staccato microdots.

Adjusting density to control midtones should be the exception and not common practice with Staccato.





- Process black ink instead of book black or recycled black inks, which have poor transfer rates. Process black ink offers the best results with Staccato, and behaves most like cyan, magenta, and yellow inks.

For Staccato 25, work with your ink manufacturer to optimize performance.

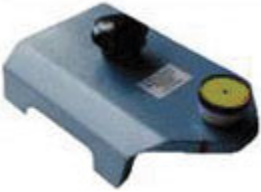



## Pressroom Process Control and Staccato

The following table shows pressroom tools that monitor press variables such as ink/water balance, roller condition and settings, cylinder pressures, and transfer surfaces (substrate, blanket, and so on).

<p><b>Thermometer</b></p> 	<p>Checks temperature of dampening solution, ink, or ambient temperature. Temperature affects the transfer properties of the ink and dampening solution.</p> <p><b>Recommendation</b></p> <p>Maintain temperature consistency for optimal ink/water balance.</p>
<p><b>Blanket caliper gauge</b></p> 	<p>Measures blanket thickness. Variations in blanket thickness could affect the dot gain of Staccato microdots, leading to color shifts across the print.</p> <p><b>Recommendation</b></p> <ul style="list-style-type: none"> <li>• Ensure that blankets have the correct thickness before putting them on press.</li> </ul>
<p><b>Torque wrench</b></p> 	<p>Provides consistent tightening of blankets to reduce sheet or web movement and variations from job to job</p>
<p><b>pH/ conductivity meter</b></p> 	<p>Checks pH and/or conductivity of the dampening solution.</p> <ul style="list-style-type: none"> <li>• Changes in pH can affect the ability of the dampening solution to desensitize the printing plate. Dampening solution pH may also have an effect on ink properties, such as drying and viscosity.</li> <li>• Conductivity is used to measure initial concentration and contamination levels. High conductivity values may indicate excessive contamination from paper or ink that interferes with the ability of the dampening solution to perform optimally.</li> </ul> <p><b>Recommendations</b></p> <ul style="list-style-type: none"> <li>• Check the dampening solution daily.</li> <li>• Check source water weekly for variations. Increases in conductivity indicate that maintenance is required with reverse osmosis systems.</li> <li>• Calibrate meters weekly.</li> </ul>



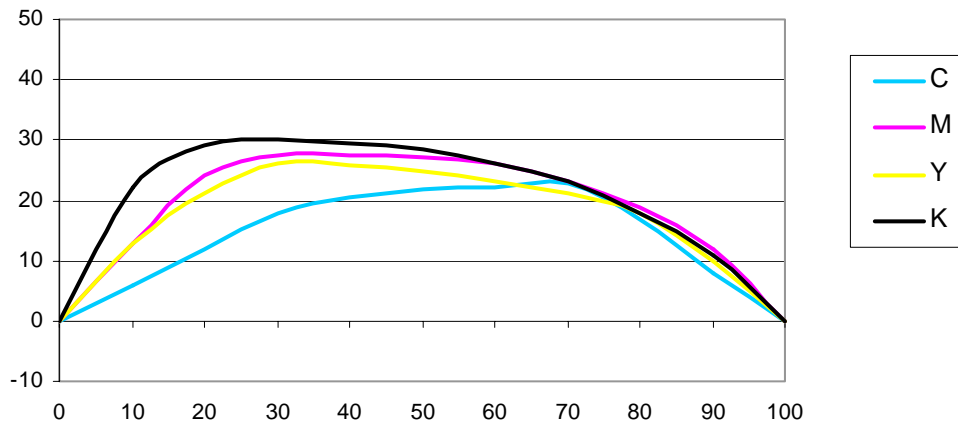
<p><b>Packing gauge</b></p> 	<p>Checks the thickness of the blanket, with packing on press, in direct relationship to the bearer.</p> <p><b>Recommendations</b></p> <ul style="list-style-type: none"> <li>• Use a packing gauge whenever a new blanket is installed on press.</li> <li>• Recheck packing after the first 10,000 impressions.</li> </ul>
<p><b>Durometer (Type A)</b></p> 	<p>Measures the hardness of rollers in the ink or dampening systems. Rubber rollers harden with age, usage, or solvent attack.</p> <p><b>Recommendation</b></p> <p>Test ink form rollers and any rubber rollers in the dampening solution, one to two times a month, to monitor the rate of deviation.</p>

## Process Control During the Pressrun

An unstable press can still print good work, but a stable press is better positioned to print consistently good work. Although space in a newspaper is limited, adding colorbars—solid, trap, gray balance, and dot gain (25%, 50%, 75%) patches, and slur targets—to press sheets provides visual and measurable targets. The color bar, used in conjunction with measuring devices, provides process control data to monitor and control print quality.

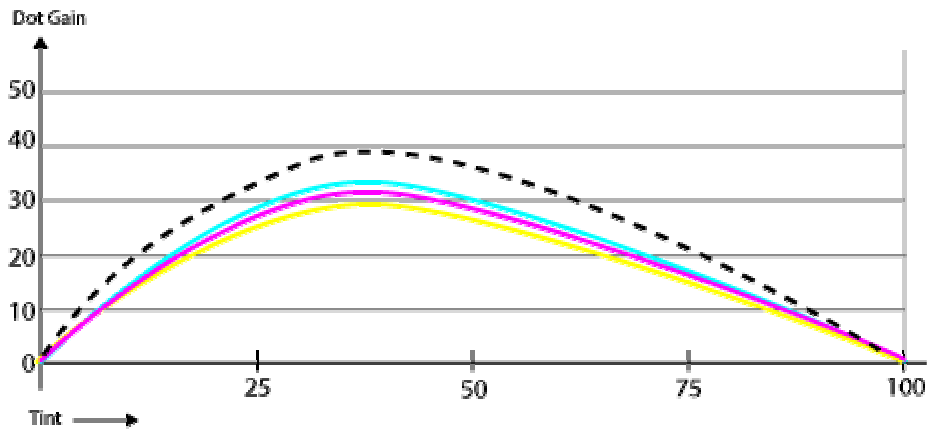
Taking measurements is just the first step in process control. To make full use of the data, record it in a log or spreadsheet

The first graph shows that the four colors, CMYK, print with different tonal value increases. This kind of response is considered unstable, because all colors are not performing in alignment.





The second graph shows a stable printing condition. The CMY colors have similar tonal value increase and nest together in the graph. In newspaper presswork, a stable environment may show similar CMY tonal values with K tonal value being significantly lower or higher. This is not necessarily a sign of instability and this print response should be captured and used as part of the tonal calibration process.



The K dotted line indicates that the K tonal value may be higher or lower than the CMY values.

The nested colors result from the following:

- The mechanical gain of each press unit is approximately the same.
- The CMY inks have approximately the same dot gain characteristics.



## Using Tonal Compensation Curves

Good tonal compensation curves (also called tone reproduction curves or calibration curves) are key to the success of Staccato. Without tonal compensation curves, Staccato screens typically look darker than conventional screens.

Before curves are built, it is also important to establish an agreed-upon target or standard for your presswork. For newspaper printers, SNAP and SWOP standards are often quoted, but it is also acceptable to measure and characterize existing AM densities and tonal value to be used as a target.

Previous sections of this document provide guidelines for:

- Developing a stable prepress and pressroom environment
- Applying process control to track and maintain both prepress and pressroom variables

## Building Tonal Compensation Curves

For predictable tonal response on press, keep mechanical and chemical components on your press well maintained, and build tonal compensation curves when the press is in a steady state.

Following are several ways to tonally compensate Staccato screens in your pressroom:

### *1. Use Default Tonal Compensation Curves*

Your Staccato installation includes default tonal compensation curves. These predefined curves assume equal dot gain on all press units and attempt to emulate the average response of a well-maintained press. Experience has shown that Staccato, run on linear plates, has 10 to 15 percent more gain in the midtones than AM screens, so a 10 to 15 percent cutback default curve will align Staccato with AM.

The default tonal compensation curves are suitable for initial testing to evaluate Staccato performance on your presses. They are, however, unsuitable for actual production since these curves are based on *average conditions* and unlikely to match your press.

### *2. Generate Custom Curves to Align your AM and Staccato Presswork*

Generating custom tonal compensation curves, using your AM screening as a benchmark for densities and tonality, is the best method for achieving successful implementation of Staccato. This method usually provides curves that let you achieve good tonal alignments between your existing AM presswork and Staccato.

This method assumes you are happy with your current AM printing and that it is stable—it can then be measured and characterized as a target for Staccato presswork. The intent is to align the tonality of the Staccato screens to your AM screens.

Build effective tonal compensation curves by running a test form that contains measurable targets (density, dot gain and print contrast). You can use an existing reference test form, or use this opportunity to create a shop standard.



- a. Create two sets of plates for the test: one set of AM plates (tonally compensated if you normally use compensation curves), which represent your standard printing, and one set of uncompensated (no tonal compensation curves applied) Staccato plates.
- b. Run both sets of plates to your standard solid ink densities; do not run them to align with your proof. Run both test forms with the same solid ink densities.
- c. Once the densities across the sheet have stabilized, run at least 500 impressions for each type of screen.
- d. Take at least 10 sheets from the beginning, the middle and the end (30 total) of the 500-impressions press run and measure the CMYK tint scales.
- e. Average the results of the measured tone values.
- f. Enter the measured data into Harmony (for iMPAct and Prinergy) or Tone Reproduction Curves (for Brisque) to build curves.
- g. Set up your RIP and workflow to apply the new curves.
- h. Run one more Staccato pressrun to confirm that the tonal compensation curves are being applied and that they are correct.

### 3. Use Industry Standards

SNAP and SWOP specify input criteria for target densities, dot gains and gray balance specifications. However, if the newspaper printer is not printing within tolerance of these standards, it is important to determine why. Deviation may be an attempt to compensate for an underlining production problem that may be masked when printing with a coarse AM halftone dot. Success with Staccato depends upon a stable, reliable, AM-screened production.

It is important to measure and characterize these AM print conditions so they can be used as a target and foundation for Staccato presswork. If the target does not align with SNAP, then the printer must make a choice between establishing a proven in-house standard, or adjusting tonality and densities in their presswork to match the standard. If they choose to adjust tonality and densities to move closer to SNAP, this is a disruptive process that should first be done with AM presswork to assess the results. Printers should NEVER change their standards or target as they switch from AM to Staccato and should ALWAYS set their standard with AM first as this will give them a solid foundation to work from.

See the Glossary for definitions of SNAP and SWOP.

### Staccato Implementation Services

For information on the tools and services that Kodak provides to help customers with tonal compensation curves, contact your local service manager or sales representative for more information on Kodak Professional Services.



## Glossary

Term	Definition
<b>book black/ recycled, black inks</b>	Book black ink is typically used for high-density requirements. Recycled, black ink is used in high-volume applications such as publications, newspaper, flexography, and packaging to meet cost and environmental requirements.
<b>emulsification</b>	A detrimental process where big water droplets and/or too much water are suspended in the ink. Emulsification causes piling and a change in ink viscosity thus altering print characteristics (density, dot gain, print contrast, trap, hue, and grey balance).
<b>flat-tint mottle</b>	Blotchy, uneven, flat tints with an orange peel texture caused by ink breaking down. Flat-tint mottle is most evident when you look at solids under a loupe. Most common in Pantone Matching System colors with coarsely ground pigments. It is also common with high pigment loads when emulsification leads to uneven ink films being transferred to the sheet. Low water levels cause PMS colors to bleed in Staccato tints, leading to excessive gain and further mottle. Flat-tint mottles are bad in blues, greens, and alkaline browns.
<b>Hybrid AM screening</b>	Hybrid AM screening techniques overcome the resolution limitations of AM by transitioning from AM to FM techniques in the highlights and shadows.
<b>ink piling</b>	Ink piles or cakes on plates, blankets, or rollers due to improper transfer to paper.
<b>optical dot gain</b>	<p>Optical dot gain is the increase in the amount of light trapped by a dot, beyond the physical size of the dot. This increase happens because light striking white paper may be diffused by the paper and subsequently absorbed by a nearby ink dot, rather than leave the paper. The absorption of this diffused light makes the dots appear effectively larger than their physical size.</p> <p>Under a microscope, the physical size of the dot corresponds directly to the bitmap tint percentage plus the physical dot gain. To the eye (or if measured with a densitometer), the amount of light corresponds to a dot area that is effectively greater than the physical dot. The overall light-absorbing effect of the dot, by virtue of its physical size and optical dot gain, is the tonal value.</p>
<b>paper piling</b>	Paper piles or builds up on plates or blankets due to the adhesion properties of the paper.
<b>pick and pile (in reference to press blankets)</b>	The paper surface is pulled (or picked) off the sheet and piles on the blanket, rollers, or plate.
<b>plate blinding</b>	Plate image is visible on plate but does not carry ink.
<b>plate grain</b>	<p>Plate grain can be any of the following:</p> <ul style="list-style-type: none"> <li>• Plate grain lines on the plate surface of the back of the plate.</li> <li>• Plate anodization lines are when the processed background appears on the front side of the plate.</li> <li>• Plate coating lines are unexposed plate and processed foreground.</li> </ul>



Term	Definition
<b>physical dot gain</b>	Physical dot gain means there is a change in the physical size of the dots during tonal reproduction. Changes in the physical size of the dot can happen at two points in the process: <ul style="list-style-type: none"> <li>• Imaging and processing the plate</li> <li>• Printing on press</li> </ul>
<b>press roller grind lines</b>	Imperfections in the rubber rollers caused by grinding in manufacturing and wear on press. They show up as dark lines in the direction of paper travel through the press and with a pitch of one to three millimeters. You can see them in solids, using a loupe. They are sometimes visible to the eye between the 50 and 75 percent Staccato tints.
<b>roller streaks</b>	Repetitive streaks across the web caused by rollers bumping and bouncing as the plate cylinder rotates or by mechanical ghosting of image elements left over on rollers.
<b>shear (in reference to ink)</b>	The capability of the ink film to withstand excessive pressure and transfer properly during the printing process.
<b>SNAP</b>	Specifications for Non Heatset Advertising Printing. First published in 1984 with specifications that relate to newspaper printing. Specification includes screen ruling, highlight and shadow dot sizes, gray balance, ink densities and dot gain. ( <a href="http://www.naa.org/artpage.cfm?AID=1160&amp;SID=140">http://www.naa.org/artpage.cfm?AID=1160&amp;SID=140</a> )
<b>SWOP®</b>	Specifications for Web Offset Publications ( <a href="http://www.swop.org">www.swop.org</a> )
<b>water lines</b>	Also known as rain or all-color-rain because they look like a rainstorm. Can be seen in solids and tints. When water lines are dark, there are emulsification problems. When water lines are light (looks like lots of short scratches), water and ink levels are too low.

## About Kodak Graphic Communications Group (GCG)

The leading provider of graphic communications solutions worldwide, Kodak's Graphic Communications Group (GCG) offers image capture systems; professional color, copydot, and high-speed document scanning systems; inkjet printing and proofing systems; workflow and color management software; thermal imaging devices for film, plates, and proofs; high-quality proofing media, printing plates, and recording film; on-demand color and black-and-white printing systems; data storage products; and professional services. Creo joined the GCG in June 2005, when it became a wholly owned subsidiary of Kodak. With corporate headquarters located in Rochester, N.Y., Kodak (NYSE: EK) had sales of \$13.5 billion in 2004 and is committed to a digitally oriented growth strategy.

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