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Staccato FM Screening FAQ

Document Number:
Release Date:

Staccato is a breakthrough product in FM screening that delivers pattern-free halftones with extraordinary on-press tonal and color stability.

Q. I tried FM screening in the past and it did not work. Why does CreoScitex Staccato work?

A. While many printers were excited a few years ago about the potential for FM screening, in practice, film workflows made it troublesome, inconsistent, and expensive to implement. Today, with the unique and proven resolution of CreoScitex SQUAREspot™ thermal imaging, the plate is perfectly predictable and FM screening can be freely printed on press, with no more effort than any conventional AM screen.

Q. We also had problems with proofing. How is proofing handled with CreoScitex systems?

Staccato can reliably be proofed on Spectrum proofers when dot-for-dot fidelity is required. Spectrum not only offers FM halftone proofing, but the most repeatable halftone color on the market. Alternatively, if there is no requirement for halftone proofing then Staccato can also be color proofed using CreoScitex Iris proofers.

Q. What about the dot gain? FM prints way too heavy – doesn't it just plug up on press?

FM screens have a different dot gain characteristic than AM screens, just like 133 lpi screens print differently than 200 lpi. In practice, the printer can simply use the precompensated dot gain curves provided with Staccato or choose to create their own custom tone compensation curves.

Q. Does it just help to eliminate halftone moiré?

A. Staccato eliminates screening moiré (caused by screens interfering with other screens) or subject moiré (caused by screens interfering with patterned subject matter), but will not eliminate moiré in the image itself that is caused from scanning or re-sampling. Staccato also minimizes color shifts when separations are misregistered, thereby delivering greater tolerance of misregistration on press. But FM does much more.

Q. What, if any, pressroom problems are associated with traditional AM screening?

A. The quality and capabilities of modern presswork have actually been restricted by the printing characteristics of the conventional halftone screen. On conventional AM halftone dots, ink water balance requirements are unevenly distributed across the tonal range. For example, highlight dots are small islands of ink surrounded by water while midtone dots are large islands of ink and shadows are large islands of water surrounded by ink. Because their respective ink/water balance requirements differ through the tone scale, AM halftones are inherently unstable. The amount of water needed to hold midtone and shadow details open can result in highlight dots being literally washed out.

An FM screen, on the other hand, has a more even distribution of similar sized dots throught the tonal range. The result is a more even ink/water balance requirement and therefore more stable press condition.

Q. How do FM screens behave on press compared to AMscreens ?

A. Staccato screens, by their very nature, have uniformly small dot structures and carry a more even ink-film thickness across the tonal range. As a result, they are far more tolerant of increases and decreases in ink loads. With a practical adjustment range of 1.00 units of density, Staccato makes it easier for press operators to adjust color, and saturation, without sacrificing tonal integrity.

With more room to move, in-line inking issues are easier to solve and color equilibrium between competing image is easier to achieve. The even ink-films and distribution of overprint areas throughout the tonal range also reduces blotching in overprint ink-trap areas. As a result, flat areas of process screen tint builds have the appearance of being printed with spot colors.

Q. I've heard that FM makes it possible to replace spot colors with process color builds. How can that be?

A. It depends on why the spot colors are being considered. Spot colors are typically used to to provide colors that are out of the printable range of process colors. They are also used to resolve fine colored type and to provide on-press color stability in large area flat screen tint builds.

Six color hi-fi presswork extends the color gamut sufficiently to encompass 90% of the Pantone spot color range. However, hi-fi does not, by itself, eliminate other color stability problems solved by spot colors. FM screens, on the other hand, eliminate halftone artifacts, overcome overprint trap blotchiness of AM screens, and they are more tonally stable on press. FM and hi-fi color go hand in hand, making it possible to print a larger gamut, while maintaining color fidelity and integrity. By its very nature, FM printing can be routinely used with hi fi color, particularly in packaging (folding carton and label) and commercial applications. The elimination of spot colors brings subsantial efficiencies to make ready, by eliminating color changes and this becomes very important in short run DOP (direct on press) printing applications. The high resolution of FM screens and lack of coarse rosette structure also means that fine colored type and other detail maintain their integrity.

Q. What happens if I increase solid ink densities to "punch up the color" on press?

A. Staccato halftones have a much broader inking range than their AM equivalent because small dots through the entire tonal range hold a consistently thin layer of ink that doesn't spill over as inking levels are boosted. Ink

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densities can be increased substantially more than conventional screens without sacrificing tonality or print contrast, leaving the press operator with considerably more latitude to boost color saturation.

Q. Why would I consider FM if I do not print on premium papers?

A. The lithographic properties of FM screening make it suitable for printing on all classes of paper stock – from premium coated to newsprint – and even non-paper substrates. Premium papers will naturally deliver the widest tonally range as they do with AM screens. However, on poor quality papers the high resolution microdot structure of FM screens deliver an almost continuous tone look to presswork.

The microdot structure of FM screens are more efficient than the larger AM dots at filtering light as it passes through and around the printed dots. This results in greater color purity and stabilty through the tone scale, a characteristic that is particularly valuable for helping to maintain fidelity on poor quality paper stock.

Interestingly, this optical efficiency provides another advantage for FM screens over their AM equivalent. The dot gain of FM screens is largely optical rather than physical, the result is that, less ink is required with an FM screen to deliver a given tone in presswork compared to AM. This has particular value for presswork on synthetic stocks, such as plastics, and even premium cast coated stocks where slow ink drying and the resulting threat of set-off is a concern. FM's reduction in physical dot growth also reduces additional gain and offsetting seen in perfecting presswork. In addition, some studies have also shown a noticeable ink savings from this phenomena.

FM screens render detail more accurately than coarser AM screens and may accentuate poor paper grain and uneven surfaces more than AM screens.

Q. What press changes do I have to make to integrate Staccato?

A. None. Staccato prints as well as, if not better and easier than, conventional screens. In addition to the press and inking benefits discussed earlier, Staccato also eliminates halftone moiré and rosette patterns while providing superior gray-level generation, smooth vignettes, and unprecedented detail rendition. Staccato screens can be controlled from desktop applications; mixed with conventional AM screens; and applied to individual images, pages, separations or entire forms. They fit into the workflow like any other screen and are as easy to apply and calibrate as any conventional halftone. Combined with the process control and accuracy of CreoScitex's SQUAREspot imaging, Staccato is as easy to print as conventional AM screens.

However, changes in fountain solution, blankets, inks etc. may require re-characterization of presswork and new tone reproduction curves.

Q. What types of dot-gain will I encounter with Staccato and how do I handle it?

A. Physical dot-gain on plate is completely eliminated with CreoScitex SQUAREspot thermal imaging. Physical dot-gain on press is minimized with Staccato screens because the fine dotstructure does not encourage excessive ink build-up. Staccato dots are not subject to as much physical spread as the much larger AM screening dot structures.

Like all printed halftones, Staccato screens are subject to optical dot-gain, where light is trapped by the paper substrate in the fine spaces between the dots, causing darker tones than expected. This optical phenomenon is

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easily corrected with proper characterization and calibration of the printed piece. CreoScitex Harmony software makes tonal calibration easy and is fully integrated with Staccato, iMPAct and Prinergy. Second-order Staccato screens (Staccato 20, 25, 35, etc.) minimize optical gain through a unique mid-tone dot structure. The total uncalibrated dot-gain in typical Staccato presswork is only 10%; considerably less than stochastic screens in a traditional film workflow. The complete tonal scale is preserved because CreoScitex-imaged plates can hold ink on single pixel dots (~10µm). Calibration is required, not to compensate for the idiosyncrasies of a particular platesetter, but rather to adjust for the optical effects of the screen on paper.

Q. If I were to use Staccato, what would I do differently in my workflow?

A. Nothing. Staccato screens are defined as dot shapes and can be applied either at the RIP stage or in Preps™ at the imposition stage in the same way that a round or elliptical dot would be applied. The creation of a calibration curve will help bring the dot-gain in line with conventional screens and proofs. These calibration curves are defined and enabled in the Allegro and Harmony systems in exactly the same manner as other types of curves.

Q. Are FM patterns repeatable on remakes?

A. Staccato uses the same FM patterns every time it plots, delivering pixel-for-pixel repeatability. Combined with the accuracy and repeatability of SQUAREspot, Staccato is as repeatable to plate and print as any conventional screen.

Q. Are there different FM patterns for each separation?

A. Staccato uses four unique patterns, one for each process color. Staccato also supports six color sets for low resolution proofers. Future versions of Staccato may support a greater set of screens for spot, bump, and hi-fi process colors. Typically, in a six color process, the 5th and 6th colors are opposite to either cyan, magenta or yellow and are never printed in the same area of the image. This makes it possible, for example, to screen cyan and orange at the same angle, with the same FM pattern.

Q. Can I apply Staccato screens to individual objects on a page?

A. Staccato screening can be applied in most desktop applications by specifying corresponding screen ruling values, such as 20 lpi for Staccato 20. This feature allows users to specify Staccato screening for individual objects and pages. Dotshop is a CreoScitex acrobat plugin that will allow users to apply screening to individual elements in a PDF document.

Q. How many installations of Staccato are there?

A. Since release of the product in 1998, over 175 licensed copies of Staccato have been issued. Approximately 20% of the installations have been in publication shops, with 75% in commercial shops, and 5% in packaging shops.

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Q. Will I save on press?

A. Make-ready with stochastic on CTP is remarkably better than stochastic from film. The extra on-press tonal stability enabled by Staccato not only opens avenues to enhanced quality and color in presswork, but also gives room to move on press without compromising tonality, ink-trap, or contrast. This can result in faster press approvals. Staccato allows operators to exploit the full capabilities of pressroom equipment.

Q. What scan resolutions should be used? What formula calculates this?

A. There is no formula for calculating scan or image resolution for Staccato screens. Although the mid-tone frequency of a stochastic screen may approach an equivalent of 500 lpi, there is little need to scan with resolutions any greater than 300 dpi. There is no risk of developing artifacts between stochastic screens or pixelation in images, so the traditional 2 x lpi rule does not apply. Experimentation has shown that Staccato can resolve 200 dpi pixels well enough that they are visible in some printed pieces. As a result, CreoScitex recommends scanning at 300 dpi to avoid any visible pixelation or staircasing in presswork. To capitalize on the detail-rendering capability of Staccato, highly detailed and finely textured images should have resolutions of 400 dpi or higher. Lower resolution images can be used in applications where the pixelation of the image is neither visible nor problematic.

Q. How hard is Staccato to install?

A. Staccato is password-protected and only requires licensing in the latest versions of CreoScitex RIPs. It takes approximately one hour to install. Further testing, calibration and fine tuning is required if the sample calibration curves are not suitable. Test files and sample calibration curves are also copied onto the system for convenience.

Q. Can I use Staccato screens on web- and sheet-fed presswork?

A. Yes. With thermal imaging and plate technology, Staccato screens offer similar pressroom benefits for both sheet-fed and web-fed presswork.

Q. So what's included in Staccato 2.0?

A. The Staccato product family now includes both first- and second-order screens with three 20 micron FM screens. This flexibility meets the stochastic screening needs of publication, packaging, and commercial printers.

Q. What are first- and second-order FM screens?

A. Staccato first-order screens, like other traditional FM screens, represent different tones by varying the number of fixed-size dots and distributing them in a random fashion. They deliver fine detail and eliminate subject and screening moiré. However, the small size and tight spacing of first-order dots contribute to dot-gain and, despite their fine structure, the random dispersion of dots may produce a visibly grainy patterns in flat tint areas.

Staccato second-order screens render the same fine detail and eliminate moiré like their first-order FM predecessors. However, by clustering the dots into orderly patterns in the mid-tones, they produce less grain and

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less dot-gain than first-order FM screens. The clustered dots help to moderate dot gain by minimizing edge effects and mid-tone plugging, while the more regular patterns subdue grain visibility.

On magnification, first-order screens have a finer dot structure in the mid-tones than second-order screens. One might think that the finer first-order structure would have better visual results, however, the second-order structures are optimized to reduce grainy visual appearance while maintaining a fine enough structure to meet the needs of the most scrutinizing eye. Side by side comparison of the screens demonstrates that the second-order screens print more smoothly.

CreoScitex understands that the visual acceptance of these screens is a subjective decision and that many stochastic users would like to continue using first-order screens. To accommodate this preference, Staccato ships with both first- and second-order screens.

Q. What are the differences amongst the various Staccato screens?

A. Staccato prints with thinner ink films, making it ideal for printing onto a wide range of substrates including fine paper, uncoated stock, recycled paper, newsprint and plastics. Shadows can be held open without sacrificing solid ink density, contrast or gamut. Staccato meets the stability and quality needs of sheetfed and web offset printers and is gaining acceptance in commercial, publications, direct mail, packaging and newspaper printing.

Staccato 20 is the most widely used FM screen with CreoScitex customers. It is a second-order FM screen that uses a nominal dot size of 20 µm with a mid-tone frequency of 385 clusters/inch. Staccato 20 offers the printability of Staccato 20.1 but with less grain, less gain, and more consistent tonal reproduction. In practice, it is being used in the production of web based publications, sheet-fed premium commercial, packaging, label and folding carton presswork, on both caoted and uncoated stocks.

Staccato 20.1 is a first-order FM screen that uses a dot size of 20 µm throughout the entire tonal range. The mid-tone frequency of this screen is equivalent to 425 lpi. In practice, it is being used selectively in web based publications, sheet-fed premium commercial, and label printing.

Staccato 25 is a second-order screen that uses a dot size of 20 µm with a mid-tone frequency of 240 clusters/inch. With an average dot size of 25 µm, Staccato 25 offers the printability of other 20 micron screens with a slightly coarser mid-tone structure, and is intended for web printing on uncoated stock for sheetfed and web presswork.

Staccato 35 is a second-order screen that uses a dot size of 30 µm with a mid-tone frequency of 240 clusters/inch. With an average dot size of 35 µm, Staccato 35 offers the printability of coarser FM screens with an overall smoother midtone result and is suitable for printing on uncoated stock for sheetfed and web presswork.

Staccato 50 and 70 screens are suitable for very coarse applications where large structure is required. Grain and structure will be visible at normal viewing distances.

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