Spot

Stochastic screening hit the news headlines in a frenzy of
and ten manufacturers to overcome technical hitches.
revolutionary screening technology, and we ask users to

It was at Ipex '93 that people started to become interested in stochastic screening, thanks to the launch of Diamond Screening and CristalRaster by Linotype-Hell and Agfa respectively. Since then all the major vendors of imagesetters and rips have provided this alternative screening option: Crosfield-Lazel; Barco-Monet; Scitex-FullTone; Dainippon Screen-Randot; Scangraphic-High Fidelity and Harlequin Dispersed.

The ability to produce stochastic screened output from desktop systems, using free standing software from UGRA/FOGRA-Velvet and Vitec-Ornament screening, greatly widens the interest in this technology.

Below, Pira's Kelvin Tritton takes an in-depth look at the technology, while *PrintWeek* asks users for their verdicts.

ATTRIBUTES OF STOCHASTIC SCREENING

Stochastic screening is no different to conventional screening in that the reproduction of grey levels is achieved by covering more or less of the paper with ink, but there are very significant differences in the way that this is achieved.

With conventional halftone screening, the imagesetters placement of spots are ordered within a cell matrix, to create symmetrical shapes in the form of variable size dots, and these are further arranged to form a geometric pattern.

In stochastic screening, the variable area coverage or tonal value is achieved by placing the spots in an apparently random pattern. This can be seen in Figure 1.

The tone gradations in conventional halftone are achieved by varying the size of dots, with their frequency remaining constant, defined as the amplitude modulation of dots (AM screening). In stochastic screening the dots (microdots or spots) are a common size and vary in their frequency and position. For this reason it is also referred to as frequency modulated screening (FM screening). This is represented in Figure 2.

SPOT PATTERNS

In order to provide the benefits associated with FM screening, the algorithm that controls the pattern of spots must aim to achieve a degree of uniformity in size and spacing, without creating the regular geometric patterns which are associated with AM screening. Differences in the pattern of spot placement are clearly seen when examples of different stochastic screening methods are viewed under magnification, as can be seen from the two examples in Figure 3.

If the algorithm produces spot clusters, we see this as visual noise or graininess. This visual noise is most obvious in mid-tone values – at lower tone values there is little tendency for spots to join in clusters and in the darker midtones the clusters are increasing in frequency as the tone progressively becomes a continuous ink film.

FM screened images with equivalent spot size, which are printed on uncoated papers display less noise than on coated. This is partly because of the lower density that is achieved, but also because of the greater visual noise inherent in the paper surface.

WHAT SPOT SIZE?

For AM screening it is normal for the screen ruling to be specified according to process and substrate. With FM screening, the specification of spot size is equivalent. It is necessary to use as fine a spot size as possible, to ensure that the structure of the stochastic distribution is not obtrusive. But this has to be balanced against the increased difficulty that arises in photomechanical transfer stages with smaller spot sizes.

Table 1 indicates the typically recommended spot size for work type and substrate. The spot size may simply be expressed in terms of output resolution, for example 1,200 dpi converts to 21μm spot size, but 2,400 dpi would also be used to produce 21μm spots, by forming each screening spot from four imagesetter spots.

TONE TRANSFER CHARACTERISTICS

The most significant factor that has to be adjusted when producing FM screened films is correction for the differences in tone transfer. This is to be expected as the elements are significantly smaller than the dots in AM screening. This results in greater tone value change in platemaking and higher overall dot gain in the final print. With positive working, we can anticipate the dot growth to be in the region of 10 to 15% higher in the midtones when compared with 60 lines/cm AM screening. Print tests which we have undertaken indicate a similar tone transfer for FM screened images with a spot size 21μm as that obtained when printing 120 lines/cm AM screening.