Activity 4: Prinergy’s Flexo Screening technologies

Overview

Why you should complete this activity

In flexo printing, the reproduction of highlight dots has always presented a challenge. With the Kodak Flexcel NX system, a much smaller highlight dot can be held on plate than with competing technologies. This creates unique challenges for both the RIP and the press.

This lesson provides an overview of hybrid screening and shows you how to choose the appropriate screening type for your needs.

What you need to know

Print conditions

Different types of flexo printers can hold different sizes of highlight dots on press. A narrow web label printer may be able to hold a 0.4% dot at 175L on press, whereas a wide web flexible packaging printer may only be able to hold a 2% dot at 133L. We refer to these as different "Print Conditions", and have assigned Conditions A, B, and C to represent how small a highlight dot a particular combination of press, ink, and substrate can produce. "A" represents the best possible scenario, (such as holding a 0.4%), whereas "C" represents the worst, (such as holding only a 2%).

Hybrid screening

Since flexo printing gains more in the highlights than offset, a 2% screen may actually be 8% or even higher when measured on the press sheet. If a screen is meant to fade to zero, a hard "edge" would appear where the dots suddenly stop. Hybrid screening, where an AM screen transitions to an FM screen in the highlights, was developed as a way of smoothing out this "edge". Instead of a full grid of AM dots suddenly stopping once the dot has reached a certain specified diameter, the dot size will remain the same, while the quantity of dots will diminish, producing a better fade to the eye.

Kodak's hybrid screening: Maxtone CX, Maxtone FX, and Maxtone SX

Kodak now offers three options for hybrid screening; CX, FX, and SX. These options offer a range of methods for transitioning from AM to FM dots in the highlights or shadows, from a simpler method to more sophisticated methods. CX is the simplest method and SX is the most sophisticated. The more sophisticated methods (FX and SX) generally provide a smoother visual appearance. However, depending on the print conditions, they may be more difficult to run consistently on press. Kodak suggests that you use Kodak Maxtone SX as a first choice, but recommends that you get a sense of appearance and performance of the different types through actual experience with a variety of press conditions.

Maxtone CX - A dot width in microns is specified in the process template, and once the dots of the screen value approach this specified diameter, Prinergy will begin removing dots to create a lighter tone. Dots that are left remain on the AM grid. As the tone gets lighter, fewer dots are produced.

Maxtone FX - A dot size in pixels is specified in the process template, and once the dots of the screen value reach this specified pixel dimension, the screen immediately switches from AM to a true FM pattern, where all the dots are the same pixel dimensions, but are randomly placed. As the tone gets lighter, fewer dots are produced.

Maxtone SX - A minimum dot size in pixels is specified in the process template. Maxtone SX, like Maxtone FX, switches from an AM to a true FM stochastic, but uses a longer tonal range to transition from AM to FM, which gives the smoothest possible appearance to the gradient. Kodak recommends Maxtone SX as a first choice for hybrid screening.

Benefits and drawbacks to Maxtone CX, FX, and SX

The main benefit of Maxtone CX, FX, and SX is being able to produce a vignette that fades to zero without a visual harsh edge. It also allows us to control the smallest dot that will appear on plate, to match up with the customer's platemaking and printing abilities.

The main drawback of Maxtone CX, FX, and SX (or any hybrid screen for that matter) is that, especially at larger mindot sizes, once dots start being removed, the eye picks this up, and the results can be described as looking "grainy". Maxtone CX also varies the size of the mindots by 30%, which can also cause an unpleasant grainy appearance. Maxtone FX does a very quick transition from AM to FM screening. This behavior can cause an appearance of a "kink" at the transition point due to the different optical dot gain characteristics of AM and FM screening.

Hyperflex (Classic)

Kodak Hyperflex performs the opposite function of Maxtone—it ensures that all dots are present on the AM grid, and allows us to effectively "override" the size of these dots. At high (over 150lpi) line screens, the dots in the highlights can approach a single pixel. However, the RIP is capable of producing tones that are lower than this "full grid". Since the RIP cannot make a dot smaller than one pixel, it starts removing dots from the grid. This produces the same grainy appearance that plagues hybrid screening. Hyperflex will fill in these dots, to ensure a smooth appearance. Hyperflex also allows us to compensate for print conditions by overriding smaller dots with ones where we specify the size.

In the process template, the Hyperflex dot size is specified in pixels, and represents the smallest dot the RIP will produce, as well as ensuring that all the dots exist on the grid.

The main benefit of Hyperflex is a smooth, even, highlight mindot, with no graininess. The main drawback is if there is a fade to zero, there will be a visible edge, or drop-off.

Hyperflex Advanced is not used in the Flexcel NX application.

Usage

A general rule of thumb is to use Maxtone if there is a fade to zero, such as a drop shadow, but to use Hyperflex if there is continuous tone throughout.

Dot shapes and line screens

Prinergy Screening Tower for Packaging offers a wide selection of dot shapes and line screens.

When Maxtone CX is selected as a **Screen Type**, any type of dot shape can be selected from the menu. When Maxtone FX is selected, available dot shape options are **Round**, **Light Elliptical**, and **Round- Square (Euclidean)**. When Maxtone SX is selected, available dot shapes are **Round1** and **Euclidean**. **Round1** acts like a traditional **Round Dot** in that it does not turn into a square dot at the 50% point, but instead gets progressively bigger until the sides touch at about the 65% point. Once the sides touch, the star-shaped void rapidly transitions to a true round shadow dot, which helps to reduce shadow dot gain and keep the highlights more open.

Dot gain curves

There is a standard set of dot gain curves that is installed with a Flexcel NX system. Whether using Harmony or ColorFlow, the standard Flexcel dot gain compensation curves are labeled c3-12 through c3-42, and represent the dot gain seen on press with an uncalibrated plate. The dot gain is determined by measuring the 50% patch on a printed press sheet, then selecting the dot gain curve in the process template closest to the amount of gain. For example, if the 50% measures 78%, use c3-28, as there is 28% gain. These curves will normalize the gain to a desired 19%.

Process template settings

The Flexo Media Specialist will communicate to the Flexo Workflow Specialist the print condition and what size of minimum dot is required for a particular combination of press, ink, and substrate at a site. Your site may have only one setting, or several, or many, as is in the case of a trade shop. The Flexo Media Specialist will also determine which dot gain curve to use.

All these settings are entered in the **Calibration and Screening** section of the Loose 1-Up Artwork Output process template.