AN ALTERNATIVE FOR SCREEN ROLL LINE COUNT?

WILBERT STREEFLAND POSES THE QUESTION – DO WE NEED TO CHANGE THE WAY WE MEASURE OUR SCREEN ROLL LINE COUNT?

WILBERT STREEFLAND

Wilbert Streefland has worked in the corrugated industry since 1992. During this time, he has been Technology Development Manager for SCA Packaging as well as Technical Manager at Stork Screens. He started Technology Coaching BvbA in February 2005. He supported FEFCO writing the 'FEFCO standards for converting equipment, technical specifications for equipment and processes' handbook. He can be contacted at wilbert@tcbvba.be

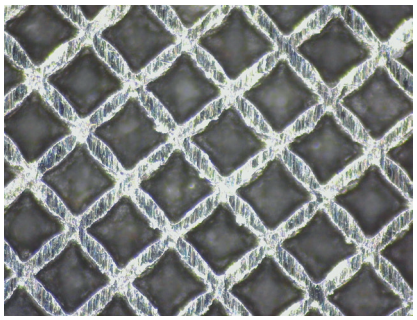
Sometimes, we need to redefine what we do. This particularly applies to flexo printing, even though our industry focus is on inkjet printing these days.

In the early days of flexo printing, screen rolls were used with lines on the surface (and they still are). To identify the roll configuration, the term 'line count' was used with the unit l/cm or l/inch and often in addition the angle or feed. A little later on, screen rolls with a square pattern were introduced (anilox); they were identified also by line count. The angle under which the cells were positioned were mostly 45°. As the evolutionary process continued, so the hexagonal pattern was introduced; this too was in line count and to identify the difference with the square pattern screen rolls, the angel was defined as 60°, (which depending on what you define as median, could also be 30°). But here comes the confusing bit – a square pattern can also be positioned under an angle of 30° or 60°. Think of print plates where the square patterns have different angles in halftone depending on the colour printed.

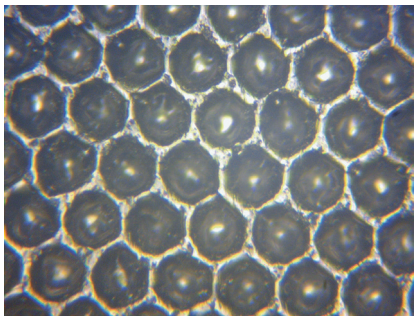
Since the introduction some ten years ago or more of the latest laser engraving technology for engraving screen rolls, we have new cell configurations – for example, elongated cells. But all of them refer to line count. The question is if line count is the right property to compare screen rolls?

Let's show you some images of the square, hexagonal and an elongated cell shape, side by side.

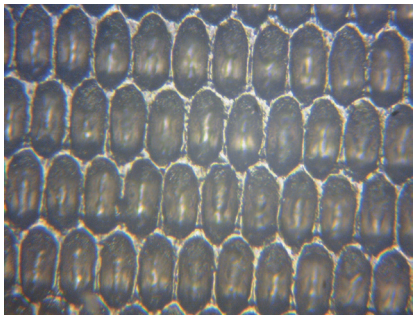
THE PROPOSED SOLUTION IS SIMPLE AND LOGICAL. WOULD IT NOT BE BEST TO STEP AWAY FROM THE TRADITIONAL 'LINE COUNT' AND EXPRESS 'CELLS PER AREA' INSTEAD?



Square



Hexagonal



Elongated

Meaningful Value?

We can all work out how to measure the line count, but is it really a meaningful value to identify how the screen roll performs or to compare screen rolls?

If we compare a square pattern with a hexagonal pattern, then the advantage of the hexagonal pattern is this; when having the same round cell diameter for both patterns, we have more cells in the same area and thus have the potential of transferring more ink. You could also say that there are more cells of the same size that can apply ink, resulting in a higher average ink film thickness on the surface of the roll.

Now, when you compare the elongated cell with the hexagonal cells in a pattern with the same line count, you see bigger cells. Hence it is very likely that, although you might have the same average ink film thickness available on the surface of both rolls and the same line count, the bigger cells of the elongated cell pattern transfer more of its ink in the cells to the plate surface.

Ink Transfer

It should also be noted that ink transfer can be completely different, depending on the screen roll when it is transferring ink to a full tone area compared to a halftone area (dots on the print plate).

So, is there a more logical way to compare the performance differentials of screen roll than only using line count and ink film thickness on the surface?

The proposed solution is simple and logical. Would it not be best to step away from the traditional 'line count' and express 'cells per area' instead? For example, cells/cm^2 or cells/inch^2. Introducing this term would allow us to compare rolls 'like for like'; when the screen rolls have the same average ink film thickness on the surface of the roll and the same number of cells per area, then the ink transfer differences are likely to be due to the cell shape.

Here is a list of what could be the variables that define a screen roll cell pattern:

1. Average ink film thickness on the surface of the roll, unit: µm (cm^3/m^2 or BCM/inch^2);
2. cells per area, unit: cells/cm^2 or cells/inch;
3. The elongation factor of the cells (for hexagonal and square pattern this means round cells);
4. Cell wall thickness, unit: µm;
5. Cell depth, unit µm;
6. Surface area %.

Channel Shapes

The question that remains is how to define channel shape patterns that are also commonly used. The average ink film thickness on the surface of the screen roll is still the key variable. For all screen rolls, pattern types and dimensions can be measured to show the ink transfer as a percentage of what is available on the surface of the screen roll. Ink transfer therefore needs to be measured in terms of the ink density (kg/m^3), at least for three different ink densities – and this is applicable when printing full tone and a predefined halftone area.

The smaller the difference in full tone equivalent ink transfer for a full tone and a halftone area, the lower the dot gain will be. Having a constant ink transfer for full tone and halftone would be the preferred method for screen roll configuration.

At the same time, the full tone area printed needs to be without defects. Each substrate requires a minimum ink film thickness to avoid printing defects in full tone. Paper manufacturers might consider specifying the minimum required ink film thickness for the individual paper qualities, based on a standardised print test using a standardised ink.

Our industry would make significantly more money when focussing on zero waste and defects. The starting point should be the setting of targets based on logical and realistically measurable standards – cells per area being one for screen rolls. ■