

Anilox rollers – a key component in flexo printing

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Anilox rollers are used in a wide variety of ways, with examples including the transfer of large quantities of a very wide range of different media to substrate surfaces in coating systems, ensuring sufficient adhesive is applied in laminating systems or the coating of printed products in order to provide high quality finishes or to create a barrier. In flexo printing, it is the anilox roller that delivers a defined quantity of ink to the forme, allowing corrugated board, flexible packaging substrates (films, absorbent substrates) and label materials to be printed successfully.

Each of these applications imposes its own very specific requirements on the anilox roller. The ceramic coating and its porosity, the laser engraving (type of surface structure, geometrical shape and volumes of the cells), the degree of finishing of the cell walls and the surface tension of the anilox roller all have a far-reaching influence on the properties of the medium being applied (ink, coating, adhesive, etc.) as well as the way it behaves during transfer to the substrate.

Opaque white in flexo printing

The uniform and pinhole-free application of opaque white ink is fundamental to high quality flexo printing. It provides the contrasting background for bar- and QR-codes and it blocks light transmission through transparent films. The aim is to achieve the same quality of ink deposition as in gravure whilst consuming the lowest possible amount of white ink. In order to achieve this a highly pigmented white ink and/or structured halftone surfaces on the flexo plate are used.

Both the structure of the flexo forme (sleeve, tape, plate) and the printing speed have a major impact on how much white is applied and the quality of this application, and

it is vital to determine the correct anilox roller volumes (cm^3/m^2) to suit the specific print job.

There are three quality categories for white ink application:

- **“High”**: In this category the quality of the application is close to that of gravure but this entails high ink consumption and, consequently, high ink costs.

- **“Moderate”**: In this category the requirement for opacity is not so high but the quality of the application is still good and it results in a closed surface.

- **“Low”**: The quality of the white on the substrate is still acceptable but the focus in this category is on optimizing costs through the lowest possible ink consumption.

Each of these different quality requirements results in different set of demands on the anilox roller configurations during flexo printing.

→ For “High”

Conventional, high quality flexo printing requires a double application of white. The first printing unit generally has an anilox roller with a cell volume of between 6 and 9 cm^3/m^2 , whilst the cell volume for the second one is 12 to 14 cm^3/m^2 .

Nowadays, it is possible to achieve almost the same visual and quantitative printed results for a

lower cost with just one anilox roller, provided that it has been laser engraved with elongated cells. Such rollers have cell volumes of between 14 and 18 cm^3/m^2 and a ruling of between 120 and 160 l/cm. Elongated cells are clearly flatter than hexagonal cells and the proportion accounted for by cell walls is much lower. This improves their ability to take up ink and their ink transfer performance is outstanding, guaranteeing a pinhole-free, gravure-like quality of application.

Flexo printing performance can also be improved by replacing ceramic anilox rollers with TeroLux (tungsten) coated rollers from TLS Anilox GmbH. These offer long lifespans, low cleaning requirements, reduced blade wear and excellent ink behaviour (lower ink consumption). The resulting improved print quality and higher productivity reduces cost pressures on a flexo printing company over the long term.

→ For “Moderate”

Ceramic anilox rollers – hexagonal cells, 60° angle, 100 l/cm, 14 cm^3/m^2 – have been used for years for this category. Optimized ink recipes, structured plate surfaces and anilox rollers with elongated cells (200 l/cm, 10 to 12 cm^3/m^2) have led to further improvements in flexo printing. However, TeroLux anilox rollers (200 l/cm; 60° angle, 10 cm^3/m^2), which offer the benefits described above, are clearly a superior alternative for applications in this category.

→ For “Low”

The classic variants for this category are ceramic anilox rollers with cell volumes of from 8 to 10 cm^3/m^2 . Today, anilox rollers with elongated cells (300 l/cm to 360 l/cm, 6 to 8 cm^3/m^2) are increasingly being used. Here too it is possible to use TeroLux anilox rollers (400 l/cm, hexagonal, 60° angle, 5 cm^3/m^2).

Engraving elongated cells in



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Source: Ansgar Westendorp

combination with TeroLux coated anilox rollers allows up to 20% more ink to be transferred to the substrate. In combination with structured plate surfaces, such rollers can achieve a considerable degree of opacity and colour densities with limited ink application (reduced ink consumption). However, the successful printing of such gossamer thin ink layers requires homogeneous ink deposition.

High quality flexo printing

Ceramic anilox rollers featuring elongated cells with volumes of between 5.5 and 10 cm³/m² and rulings of between 200 and 460 l/cm are frequently used for the printing of solids, line elements and technical halftones. However, if such rollers are used for the printing of very fine halftone gradations, as well as halftones with high screen rulings then it can result in the over-inking of highlights. The reason for this is excessive ink delivery due to the open structure of the elongated cells, which boosts ink transfer. This in turn means that print production needs to be interrupted in order to clean the flexo plates.

The recommended anilox roller for such applications is a ceramic one with hexagonal cells (60° angle, 460 l/cm, 5.5 cm³/m²). However, the shape of such cells resembles that of a test tube and the depth combined with too narrow an opening and high adhesion forces impedes optimal emptying of the ink from them. Anilox rollers with these parameters do not generate sufficient colour densities, have a tendency to exhibit scorelines and need to be cleaned frequently. The TeroLux surface offers one solution to these problems. It allows cells to be engraved with narrow, steep and stable walls as well as flat floors. The very smooth melted inner area of the cells, combined with a lower surface tension, reduces the adhesive forces. As a result, significantly more ink is transferred, high colour densities are achieved and the very finest highlight dots are not over-inked, even in the case of long runs. Since the ink does not dry in the cells, TeroLux anilox rollers can be used for weeks without needing to be cleaned.



Source: Anggar Wessendorf

A view of anilox roller production at TLS Anilox

Fixed Palette Printing

Extended Gamut Printing or Fixed Palette Printing (FPP) is not new but to date it has only been used by a very small number of flexo printers even though the advantages are widely known and easy to understand. Why is this the case? Numerous mutually interdependent variables can influence the printing process and these need to be mastered, whilst even small deviations can have a major impact on the printed result. Any flexo printer thinking about adopting Fixed Palette Printing needs first to standardize every variable that might have an impact.

FPP is always used with screened motifs and to print spot colours reproducibly using this technology and to secure the acceptance of brand owners it is absolutely essential to use screen rulings of between 70 and 80 l/cm. Screen rulings as fine as this require anilox rulings of at least 500 l/cm or more and ceramic coated anilox rollers are at their limits at such high rulings. Whilst high quality printing with limitations is still possible it quickly becomes apparent on close examination of the costs and productivity that it is difficult to make a profit with FPP.

TeroLux anilox rollers with a ruling of 500 to 600 l/cm and engraved at 60° have been in regular use on three continents for years and have demonstrated a high degree of reliability. Their users are active in various different fields but what they most prize is the scoreline-resistant tungsten surface. What's more, TeroLux anilox rollers can be used for at least 14 days and more without needing to be cleaned, so

guaranteeing the printing of uniform colour densities throughout this period.

Summary

The latest flexo presses offer a high degree of automation and modern monitoring and control systems to ensure seamless quality assurance, whilst current developments in pre-press and plate technology make ever higher print qualities, together with significantly improved reproducibility and simultaneously enhanced flexibility possible. In recent years many flexo industry suppliers have developed innovative product solutions to make these ambitious goals a reality. TLS Anilox GmbH, which has opened up the prospect of improved print quality and higher productivity for many flexo printers with its laser engraved TeroLux anilox rollers, is a prime example of such a supplier.



Source: TLS Anilox

The right anilox roller for any application

TLS Anilox GmbH, which has been based in Salzkotten in eastern Westphalia since 2014, develops high tech anilox roller and anilox sleeve solutions for the printing and coating industry. The anilox team also specializes in the laser engraving of anilox rollers in order to offer a very wide range of different geometric structures (cells, lines etc.). TLS Anilox is a member of the TeroLab Surface Group, whose holding and management company is based in Lausanne, Switzerland.