

CLEANING ANILOX ROLLS

Flexo continues to be a printing/varnishing process on the move. Technological advances have resulted in the ability to produce the best ever high quality line and process printing. The quality is so good in fact, that flexo is now competing directly with gravure and offset, as we see both narrow and wide web flexo presses being promoted to the folding carton market. Meanwhile, sheetfed litho press manufacturers continue to offer anilox equipped coaters providing in-line coating capabilities. The flexo liquid ink printing/ coating process is converging on the traditional paste ink sheetfed offset printer from both directions.

The flexo printing/coating process depends upon the precise controlled transfer of a liquid ink, varnish or coating. An anilox roll is simply a metering roll designed to consistently supply a uniform and measurable volume. Anilox rolls have been produced by a variety of methods. Older methods of mechanically engraving cells into the surface of a roll have now been replaced, to a large extent, by the precise computer controlled laser engraving of ceramic coated steel rolls. In this process, millions of minute holes (cells) are drilled into the ceramic surface of the roll.

Laser engraved ceramic anilox rolls provide:

- *Great wear resistance*
- *Great impact resistance*
- *Great corrosion resistance*
- *Great precision of cell depth, concentricity and roll dimensions*
- *Great consistency with very accurate ink/coating delivery across the entire roll*
- *Virtually unlimited screen count & volume*

Anilox rolls may be engraved with a variety of cell shapes. Some cell shapes are better than others when it comes to the effective clean release of liquid inks, varnishes/coatings, so that cell plugging is minimized. Maintaining clean full volume cells is critical considering the requirements of precisely releasing a measurable quantity of liquid repetitively.

Mechanically etched cells with pointed bottoms and corners release poorly and plug frequently. Certain laser engraved cell shapes also release poorly and plug frequently. All in all, the best cell shapes for liquid release and lack of plugging, in order of preference, are spherical, parabolic, and quad. The poorest cell shapes are tear drop, pyramid, cone and test tube, again in order of preference.

Channeled engraving is used to produce joined cells that are designed to release heavy volumes of coatings. The cells flow freely but tend to plug easily requiring frequent cleaning.

Considering ceramic anilox rolls, another factor in cells plugging with unreleased and eventually dried inks and coating, is the porosity of the ceramic coating itself. Experts say that a ceramic coating should have a porosity level of less than 3%, because a porosity above that level will cause plugging and contamination problems. All ceramics are porous to an extent, such that acids and alkalis can migrate through. Aside from these issues the most common cause/effect problem with cell plugging is the cell depth to opening ratio. If the anilox cell depth is too deep with relation to the opening of the cell, the cell will plug easily. A properly designed anilox roll will be engraved to essential dimension criteria. The proper cell depth to opening will give maximum liquid release and minimal plugging tendencies, while maximum plugging will occur with an improper depth to opening ratio. During use, an anilox must be maintained to its "depth to opening" specification. Doctor blade pressure must not be allowed to cause anilox wear or scoring.

CLEANING

Anilox rolls, when plugged with dried inks or coatings/varnishes taking up some cell volume, cause subsequent delivery of inks, coatings/varnishes to vary in volume across the roll. This cannot be tolerated if high quality printing, coating/varnishing is to be produced.

Proper anilox roll maintenance is a must! An anilox roll should be cleaned immediately after use. Traditionally, wire brushes have been used. Brush wire can be as small as .003 in dia. and larger than a cell opening, but it is turbulence that cleans, not the wire reaching down into a cell. Always use a stainless steel brush to clean a laser engraved ceramic anilox. Don't use a brass brush because it will transfer brass to the ceramic, which can cause ink and coating to be repelled. Never use a steel brush to clean a chrome anilox roll, use a brass one. Work a brush in a large circular pattern using heavy pressure to create turbulence thereby forcing solvents into the cells to clean. After thorough cleaning, flush with solvent and wipe dry with a lint free cloth. When using a water cleaning solution, wipe the roll dry after cleaning using a lint free alcohol wipe to dry any moisture retained in the cells. Always follow anilox and ink/varnish suppliers recommendations for cleaning materials and procedures. Brand

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name, low VOC, high boiling cleaning solutions and a variety of water based cleaners are available.

Cleaning of dried inks and coating/varnishes is more difficult. Aqueous products are best attacked with caustic cleaners, but these will attack aluminum oxide containing ceramics and the sides of an aluminum roll. A 24 hr. soak, using "Easy-Off" oven cleaner, under a plastic film wrap has worked well on pure chrome oxide ceramic coated steel rolls. Sometimes a ceramic surface will pick up a metal marking. These marks can be removed by using a Q-tip wetted with a weakly concentrated muriatic or nitric acid solution.

New innovative technology has brought on several other anilox cleaning methods:

- *Ultrasonic cleaning*
- *Sodium Bicarbonate (Baking Soda) blast*
- *Plastic Bead blast*
- *Dry Ice blast (experimental in flexo)*
- *Hot water/solvent soak*

Ultrasonic cleaning uses sound energy to form cavitation in a liquid bath to clean the anilox. Bubbles scrub and clean. 400 + line screens are subject to thin cell wall damage and the cleaning process itself is slow.

Sodium Bicarbonate blast cleaning uses medium air pressure to drive baking soda against the anilox surface, where it explodes on impact quickly cleaning the finest anilox. On-press and off-press systems are available

Polyethylene bead blast cleaning uses medium air pressure to drive small PE beads against the anilox where the impact cleans. PE is non-abrasive and is said to cause no damage to chrome or ceramic anilox rolls. Available automated systems operate off-press.

Dry Ice blast cleaning uses granulated dry ice which is blasted against the anilox surface to clean. The dry ice media is tiny and is said to reach into the smallest screen anilox. Dry ice is non-abrasive and it sublimates easily, gassing off quickly, expanding in volume to clean.

Hot water/solvent soak cleaning is a process that uses a heated water or solvent solution to soak and clean an anilox roll. A high pressure spray is used in some systems. Available aggressive environmentally safer solvents make this

technique viable to some.

Summarizing, the best anilox rolls will always require cleaning. Today, it is possible to produce the very highest quality competitive flexo printing, coating/varnishing ever done, but a clean anilox is always required.

Whenever you consider flexo, consider **CORK!**

LOOK TO CORK!..... for your coating and varnish needs, for both **aqueous** & **UV/EB** coatings/ and varnishes.