

### CHAMBERED DR. BLADE COATERS = PRECISION OFFSET COATING

Who would have thought that flexo style chambered doctor blade coaters would become the dominant coater type used on offset presses. Well read on, since they have, producing high levels of precise, repeatable application of clear coatings and metallics.

When many of us hear the term "engraved roll" we automatically first associate it correctly with gravure, a print process where it plays an integral role. Through technological advance, engraved rolls have now also become a key to the amazing rise in high quality flexo. The fast growing flexographic printing industry has been able to radically improve print quality to the point where some say it is able to compete head to head with offset litho.

Quality improvements have come in great part from advances made in ink/coating metering systems. Introduced in the 1980's laser engraved ceramic anilox rolls lead to the use of single doctor blade designs, which have been further improved with the addition of enclosed chamber systems and double doctor blades. These technological advances have not only allowed a radical improvement in print quality but there is also a reduction in VOC's.

Chambered doctor blade, laser engraved ceramic anilox roll systems proven by years of use in flexo are effective metering inks, UV and aqueous coatings, as well as primers. Application is precise, uniform, and consistent. Scratches, voids, thickness variations, slinging, and ribbing, all common problems to be guarded against with multiple rubber roll systems, are eliminated.

Maybe not surprisingly based on their history, these systems first offered the offset printing industry only a few years ago now have become the preferred coating device on offset presses. First applications touted the ability to apply metallic flexo type aqueous inks to offset printing such that powdered bronzing could be simulated. The advantages of this in-line decorating quickly became obvious and attractive to commercial printers who were using bronzing techniques off-line.

Simultaneously, the offset printer became attracted to the precision possible using the chambered doctor blade/anilox coater to apply clear aqueous coatings. Metering is so precise with the enclosed doctor blade/anilox system that metering is almost independent of press speed. Coating viscosity changes are not only minimized, with evaporation reduced, but viscosity has less effect on application too.

Importantly, money can be saved because of the ability to cut variations in wet coat weight. The amount of coating applied is precisely pre-determined across the width of the coater by the volume carrying capacity of the engraved anilox roll and the doctor blade action.

Chambered doctor blade/anilox roll coaters offer a level of precise application simply not available with other roll to roll coater systems.

The chambered doctor blade concept allows fluids to be pumped into an enclosed chamber where they are applied directly to the laser engraved ceramic roll (anilox). The anilox roll is simply a metering device used to supply a measurable fluid volume with consistency. An enclosed doctor blade system with one blade set to the anilox roll in the direction of rotation (positive angle), and the other set in the counter rotation direction (negative angle) seals the ends of the roll allowing fluid to be pumped to the enclosed chamber and circulated back to the pump. The chamber itself is locked in a bearing locating itself correctly and accurately to the anilox roll. A pneumatic system maintains a constant pressure between the chamber and the anilox roll. Chamber ends are sealed liquid tight by gaskets. Once initially set up, the system regulates contact pressure automatically compensating for doctor blade wear. After fluid ink or coating is applied in the chamber to the cells of the anilox roll, the doctoring blade by design scrapes the surface of the roll clean leaving only the fluid volume filling the engraved cells. When the anilox is in contact with a plate cylinder or blanket, the contained fluid volume is precisely released to the contacting surface and then transferred to the substrate. Photopolymer materials allow fine line patterned or spot coating applications.

Ceramic anilox rolls are fabricated by plasma torch spraying/depositing ceramic onto the surface of a steel roll. Chromium oxide (ceramic), extremely hard and low in porosity is commonly used. Diamond wheels are used to grind the ceramic roll surface to precise dimensions and tolerances. Engraving is accomplished by using a computer controlled laser which heat vaporizes a pre-determined pattern of microscopic holes (cells) into the ceramic coating. Laser engraved cells are hemispherical or droplet shaped in cross section. Once laser engraved, the roll is finished by fine polishing.

Design variables to be decided in anilox engraving are pattern (screen angle), screen count and cell volume.

OVER

Pattern is defined as the engraving angle measured from the axis of the roll: 30, 45, and 60 degrees are the most common. Thick film coatings use 45 degree trihelical and quad patterns. Thin film coatings use a 60 degree hex pattern the same as flexo inks.

The screen count of an anilox is defined as the number of engraved cells per linear inch along the engraving angle. Generally the higher the screen count the smoother the application.

The fluid carrying capacity of the roll or the anilox volume is measured in billion cubic microns (BCM) per square inch of anilox roll surface area. One billion microns = one microliter or one millionth of a liter. Volume can be chosen independently of screen count for a laser engraved roll. Application volume is dependent upon the % solids and the weight/gal. of the coating as applied since coatings are applied by volume but are weight specified.

Proper anilox roll cleaning is very important as the cell volume can change radically with dry ink/coating build-up. Simply flushing the enclosed chamber system with an ammonia-water mixture will clean-up aqueous inks/-coatings. This is fine but you need to be careful about the anilox itself. There can still be a drying in tendency in the anilox cells themselves. Never allow inks, or coatings to dry on the anilox roll. Use clean-up solutions recommended by your ink/coating supplier. Always use a stainless steel brush when cleaning a laser engraved ceramic roll, never a brass brush which will transfer brass to the hard ceramic surface so that ink/coating is repelled. Clean, by working the stainless brush in a circular pattern with heavy pressure reaching into the depth of the cells. After cleaning, flush with the recommended solvent, and wipe with a lint free cloth. If water is used, finish with an alcohol wipe to remove any moisture left in the cells.

Advantages of the chambered doctor blade/ceramic anilox coater are:

- *consistent wet coat weight across sheet*
- *uniform coverage*
- *smoother lay and higher gloss*
- *less tendency to orange peel*
- *controlled ink and coating usage*
- *wet coat weight control by anilox design*
- *fewer blocking problems*

- *reduced reliance on spray powder*
- *minimized evaporation during application*
- *reduced volatiles in press room*

Chambered doctor blade coaters are taking over the offset coater market because they can apply coatings with ease and great precision.

**LOOK TO CORK!** ..... for all of your aqueous, UV and EB coating requirements.