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Ink metering systems for corrugated flexo presses

Scope

The flexographic ink metering system contains an anilox roll that is engraved for holding precise amounts of ink. There are three basic methods for metering the amount of ink. This TIP will discuss these methods for controlling ink film thickness.

Safety precautions

No safety precautions are applicable.

Content

All flexographic ink metering systems contain an anilox roll that is engraved with a cell pattern capable of holding a precise amount of ink. An ink fountain applies ink to the anilox roll and a metering device removes the excess ink. The amount of surface ink film removed and position of the remaining ink in or on the anilox roll partially determines how the press will print.

There are three basic types of ink metering systems found on corrugated flexo printing stations with combinations and subsystems possible. The three basic systems are:

1. Rubber or elastomer wipe roll
2. Reverse angle doctor blade
3. Chambered doctor blade unit

Some options of these three basic types offered by press builders are:

- a. Wipe roll with Reverse angle doctor blade assembly
- b. Wipe roll with Chambered doctor blade assembly

In general, wipe roll systems allow an ink film to remain on the surface of the anilox roll. The ink film thickness is affected by the durometer (hardness) of the rubber compound, diameter of the rubber roll, concentricity (roundness) of the rubber roll and the speed variation of the two rolls. The higher the durometer, the harder the rubber roll. Harder rubber rolls leave less of a surface ink film on the anilox roll. Softer rubber rolls leave a thicker ink film. The amount of ink which gets delivered to the plate is the combination of that which is carried in the anilox cells plus the residual ink film left on top of the anilox roll by the wipe roll. Ink film thickness increases with anilox roll speed due to the hydraulic action of the ink.

Rubber or elastomeric wipe roll

The wipe roll rotates in the opposite direction of the anilox roll, forming an in-running nip when pressed against each other. The anilox roll runs at board speed while the wipe roll turns at some slower speed. This differential in speed causes the wipe roll to literally wipe the anilox surface while feeding ink to the anilox cells. Ink being metered between the rolls acts as a lubricant to keep the rolls from overheating. These two rolls should never contact each other without ink or lubricating solvent solutions.

Pressure between rollers can be achieved by eccentrics and by air or hydraulic cylinders. On large wide machines, to achieve uniform pressure which equates to uniform ink film, the wipe roller may be crowned (slightly larger diameter in the middle), or canted about the centerline of the press. If the wipe roll was straight, hydraulic forces could cause it to deflect which would allow a greater amount of ink to flood the center of the anilox roll.

Surface finish of the wipe roll is also important. The wiping surface must be smooth; any surface deviations will show up as poor metering on the anilox roll and as variations in the print.

Reverse angle doctor blade

A doctor blade is usually made from a flexible piece of metal or plastic. The blade fits in a blade holder which fixes the contact angle at which the blade touches the anilox roll surface. Reverse angle doctor blades are generally set at 30 degrees from the tangent with a plus or minus tolerance of 2 degrees. The blade, when properly positioned, shears or shaves the anilox roll surface nearly clean so that only the ink in the anilox cells is transferred to the printing plate. (A very thin and uniform ink film remains on top of the anilox cell walls after doctor blade metering which provides lubrication and prevents burning.) The doctor blade provides far greater control over ink film transfer than the wipe roll.

Because the doctor blades shear almost all the ink film off of the anilox roll surface the ink remaining is that which is in the anilox cells. Thus the amount of ink delivered to the plate is almost completely limited to that which is carried in the anilox cells. Because the doctor blade wears the anilox roll surface more quickly than a wipe roll, ceramic coating may be preferred over chrome plating for the surface of the anilox roll to retard premature wear of the roll.

Doctor blade holders are rigid and can be adjusted for pressure settings manually or automatically. Some systems use the weight of the blade holder to push the blade against the roll while others use a pneumatic tube. Springs, air cylinders and screws can also be used. Whatever the method, it is important that minimum pressure is used to assure a clean wipe. Excessive pressure will cause accelerated wear on the blade and the roll. Reverse angle doctor blades should meter with the lowest possible force since the hydraulic forces of the ink will also tend to push the blade against the roll. Never allow a dry anilox roll to run in contact with the doctor blade. Without the lubrication provided by the ink severe damage will be done to both roll and blade very quickly.

Chambered doctor blade assembly

This system is composed of a reverse angle blade and a containment blade with a space of 1 to 2 inches between them. These blades fit into a holder with a back plate forming a chamber. The edges of the roll face are sealed with fixed or flexible plastic, rubber or foam edge seals. When the unit is positioned against the anilox roll and ink is pumped into the chamber, the system becomes pressurized forcing all air out of the system. This allows fresh, new ink to fill the empty anilox cells as they pass through the chamber. Since this system employs two doctor blades which contact the anilox roll surface it is recommended that a durable laser engraved anilox roll will be used.

None of these systems will work without an ink circulating system. A typical ink system should have a pump (or pumps), ink container, hoses, control valves, hose fittings and FILTER. It is critical to have the ink filtered since dried ink, paper dust, and other contaminants can cause serious damage to the anilox roll. It is important to have the ink system matched to the metering system.