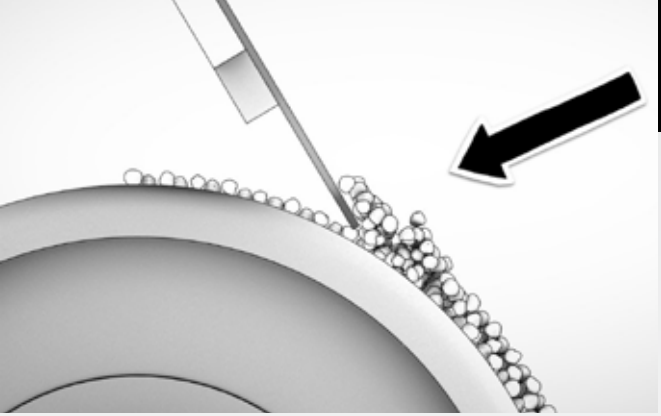
Doctor Blade Basics

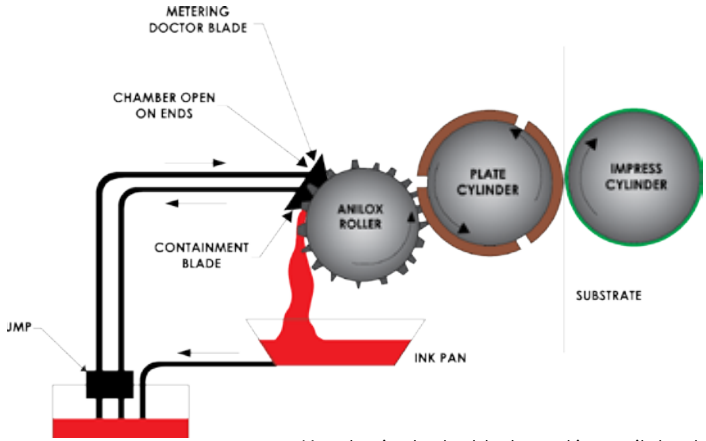


This article is intended as a basic overview of the doctor blades currently available in the flexible packaging industry. It is square one for someone who is beginning to analyze their printing facility's needs and challenges, as well as an insight into the impact doctor blades can have. If you're already working with doctor blades, this article is a good way to find out if it's time for an update.
The doctor blade and anilox roll are two key components to achieving the perfectly matched colors and tonal ranges we find in modern flexographic printing. Every year, our industry spends millions of dollars on new presses, graphics, digital prepress and mounting systems. Producing better and more consistent printed packaging is always the goal, as companies compete for their share of the market. Yet no matter what other investments are made, the success or failure of a print job is often determined by how well a doctor blade meters the ink off the anilox roll during a pressrun.

How doctor Blades work
The doctor blade is mounted in such a way that it uniformly meters the ink from the anilox prior to distribution onto the printing plate.

Key factors of success include:

- Angle of blade to anilox roll (per press specs)
- Correct pressure of blade needed to roll (the least needed)
- Perfect alignment with the anilox axis of rotation
- Correct blade design, size and material for both press and job
- Easy and fast replacement as the blades wear out



Your basic doctor blade working as it should images courtesy of Pamarco

- Using the designated size specified for each press

Failure to adhere to these six factors will result in varied ink distribution and may reduce the life of the anilox roll. As the doctor blade scrapes (or meters) away the excess ink from the anilox roll, it then coats a precise film of ink onto a printing plate. The amount of ink reaching the plate determines the accuracy of the printed image on the film, paper or corrugated substrate. It is important to note two things. Anilox rolls often cost thousands of dollars; however, if they are cared for and maintained correctly, one can last years in many print applications, so long as they avoid being inadvertently damaged in handling or cleaning. Second, on the opposite end of the price spectrum, doctor blades cost very little and are designed to wear out smoothly in an attempt to maintain consistent ink metering for distribution throughout the print cycle. Changing and checking blades often can avoid print issues and damage to the anilox roll.

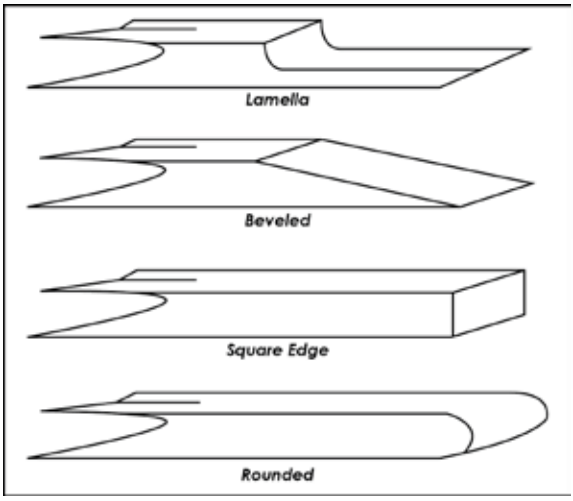
MOUNTING SYSTEMS & BLADE TYPES

- Lamella/stepped blade: With a variety of lengths, step blades provide clean and consistent metering due to a thinner contact edge, but they also wear out faster for the same reason
- Beveled blade: This type of edge allows for immediate metering. It is a very common blade, but a downside is that the "contact edge" will increase as it wears against the anilox. This results in a variation of the ink film applied during the printrun
- Square edge blade: This slit blade provides a square edge. These blades are not smooth and therefore are not suggested for doctoring. Their best use is as a containment blade made of plastic
- Rounded blade: Both sides of this blade have a smooth round metering edge that seats and remains constant throughout the run. They mount either constant throughout the run. They mount either note that they are still razor sharp blades and need to be handled safely.

MATERIALS

The material from which a doctor blade is constructed can have a great effect on how it performs, how long it lasts and even the type of job it works best with.

- Carbon steel: Either blue or white carbon steel blades are common and mostly vary in cosmetics. High quality carbon steel is strong and allows the running of a thin-



ner blade successfully. Do not try to save money on cheap blades if you are using steel. Debris from inferior steel on ceramic may get caught and rub against the anilox, causing streaks and scoring on the roll

- Stainless steel: An alternative when corrosion is an issue. These are softer than carbon steel and will tend to wear faster on ceramic anilox rolls. Debris from stainless steel blades on ceramic may get caught, causing print image streaks or scoring of the roll
- Plastic blades, UHMW: These have become popular due to some improvements in wear; specifically, they are unaffected by corrosion and safer in use. Typically used in corrugated applications, they tend to be thicker and work as effectively as steel blades for doctoring. Plastic works great for a containment blade in a chambered system
- Composite blades: One of the most promising and evolving innovations in the anilox/doctor blade relationship. Technology has allowed thinner blades with improved spring strength and structure to operate in the most challenging pressroom environments. The benefits include long wear life, being unaffected by corrosion, and being structurally rigid for clean and even metering of ink across the anilox roll. In addition, these new composite blades are less likely to damage or wear out a roll, saving thousands of dollars in new or recovered aniloxes. The best composite blades are an exact replacement for OEM metal blades and are an innovation directly correlated to improved ink metering and reduced damage to anilox rolls

COMMON BLADE SELECTION PROBLEMS

The flexographic print process is definitely not a "one blade fits all" trade. Using that mindset can lead to anyone of a number of problems. Some of the more common occurrences seen in pressrooms around the world include:

- Anilox scoring: When metal particles or filings from abrasive steel blades contaminate inks. These pieces get trapped under the blade, initially causing streaks in ink film and eventually, permanent score lines on the anilox roller surface
- Poor safety record: Press technicians often cut themselves on sharp steel and composite fiber type blades
- Short blade life: Distorted or worn blades may result in increased downtime and a more frequent need for change or adjustment
- UV ink spitting: Often the effect of cell pressure being released as the blade meters the anilox. This is most prevalent with UV ink systems and can be addressed by anilox and blade selection
- Inconsistent print: When ink tones vary or change due to blade wear or distorted and wavy blades.

Many of these problems are improved with a simple change of the doctor blade used in a specific print application. "Producing better and more consistent printed packaging is always the goal, as companies compete for their share of the market. Yet no matter what other investments are made, the success or failure of a print

job is often determined by how well a doctor blade meters the ink off the anilox roll during a pressrun."

IMPROVE CONSISTENCY & BLADE LONGEVITY

A press operator should have a deep understanding of the ins and outs of doctor blades. But as a quick run through before starting a job, here is a checklist to help dot your "i's and cross your "t's:

- Proper setup of blade
- Correct blade holder and end seal
- Correct blade to anilox lpi and volume
- The right blade type to ink
- Lightest possible blade pressure
- Good press maintenance
- Clean and filtered ink
- Optimum viscosity inks for job

The blade should always be set at the minimum pressure to create a good wipe; this is done by ensuring the geometry of the mount and blade is accurate. The blades should fit tight without leaving waves and the ink film should be designated only by the roll, so there is no excessive ink.

My personal experience has been derived from more than 35 years in the printing industry, most of which has specifically been in flexographic printing; from narrow and wide web to corrugated, and even screen and pad printing. Flexographic printing is a process with innumerable variables; print issues are virtually never the result of a single aspect in the process. Successful printing requires a great deal of measure and control to be consistent. The following is a short list of items that, in my opinion, have the greatest overall impact in getting the best out of printers for the longest possible time:

- High quality anilox with the right lpi/bcm
- The best doctor blade possible
- Consistent film or digitally imaged mask
- Correctly processed printing plates
- The right cushion mounting tape or sleeve
- Ink managed, clean and measurable
- A high quality chambered doctor system
- A well managed roll cleaning plan.

It is worth considering and testing the new composite doctor blades and choosing options that will protect the expensive anilox rolls used in your presses. Innovations in doctor blade technology make it possible for every company to invest in these high quality composite offerings. They are proven to run long and clean, and are less likely to cause expensive "scoring" or accelerated wear and damage to the anilox roll.

Andrew J. Reida - Pamarco