

Doctor Blades & Holders

Advice on Maintenance, Compatibility & Safety Issues

Bill Warner

Anyone who is familiar with doctor blades will likely know their basic function: Flexographic printing requires they provide a clean wipe of the surface of the anilox roll that is constant throughout the pressrun. When this is achieved, the ink volume carried by the anilox to the plate is determined only by the anilox volume.

If the blade is not working correctly, the ink volume carried to the plate will include the anilox volume plus some amount of surface ink. Any surface ink remaining on the anilox will be variable, leading to an inconsistent printed product.

What might not be as well known is that the highest quality doctor blade available will not be able to achieve a clean and constant wipe if the holder and actuating mechanism are not well maintained and free of mechanical damage, corrosion damage and excessive wear. The blade holder must be able to secure the doctor blade in a fixed and repeatable position without inducing any wrinkles or other forms of bending.

There are many factors that can make these functions difficult to achieve and that is why blade system maintenance is so important. This article will provide some thoughts on common blade holder maintenance and compatibility issues, as well as some tips for a safe working environment.

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MAINTENANCE & HAZARDS

It doesn't matter if you have a single blade reverse angle holder or a dual blade chambered system—maintenance of the components is critical. Like any mechanical component, the well maintained will last longer than the neglected parts, but all of these components have a lifespan and will eventually need to be replaced. In many cases, blade holders are used much longer than they should be and wind up costing more money—in the form of print defects and lost production time—than the cost to replace them.

If your holder components resemble the chamber section shown in *Figure 1*, then it is time to replace them. The chamber section shown in *Figure 1* demonstrates many of the common problems with damaged and worn chambers. The most obvious problems are blade wrinkles and corrosion pitting on the aluminum chamber body. Looking

even closer, you will see bolt heads that are not in contact with the clamp bar, due to stripped or contaminated threads and damaged heads that would prevent accurate tightening.

Dried ink or coating accumulation on the holder, blade clamping bolts and associated actuating components are possibly the largest contributors to component failure by damaging threaded connections and adjustment mechanisms. Dried ink will tend to freeze threaded components and prevent them from rotating without excessive force—if at all. The excessive force needed to move the components will eventually lead to their damaging. In addition, dried ink that is left on a holder could break free during a pressrun and get trapped by the doctor blade, leading to print defects or, worse, anilox scoring.

All holder components should be cleaned before installing new doctor blades to remove any accumulated ink or coating. The surfaces that come in contact with the doctor blade must be free of any raised areas formed by accumulating ink or mechanical damage. Any imperfections on these surfaces will cause doctor blade wrinkles and negative results on press. All surfaces of the blade holder should be inspected for damage either caused by impact during handling or corrosion from contact with the ink system.

Aluminum is sometimes used for holder components because it is lightweight and strong. However, water based inks are known to attack aluminum components unless the material is protected by

some type of corrosion resistant coating. Most of these coatings will eventually fail and expose the aluminum to direct contact with the ink, resulting in the beginning of corrosion. Blade holder components made from non corrosive materials are available and recommended for use in applications for parts in direct contact with the ink. *Figure 2* shows a section of a used chamber that was manufactured from glass epoxy composite and stainless steel materials. You will notice that even though the holder had been in use for a period of time with water based inks when the picture was taken, there is no evidence of damage or corrosion to the chamber components.

BLADE TIPS

Some additional thoughts to consider when working with blades and blade holders:

- Holders should be checked periodically to make sure they are straight. Holders can deform over time and a simple check with a known straight edge applied to the blade mounting surface will reveal issues that would need to be addressed
- When installing blades in the holder, be sure they are parallel to each other. Most holders provide some method to align the blade to the holder and set the amount of extension beyond its edge. Common methods may be a step machined in the holder

Tired of the Status Quo?

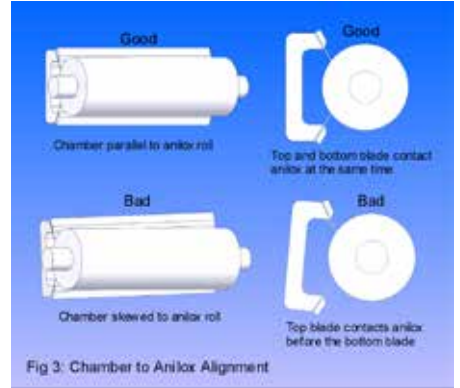
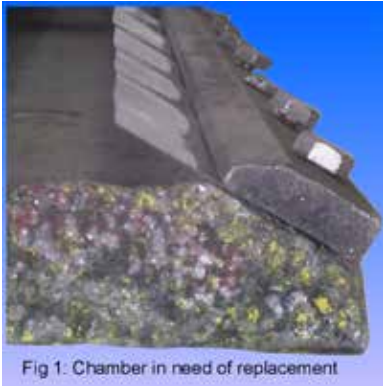
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- or dowel pins that locate the back edge of the blade. Be sure the alignment provision is in good condition
- If bolts are used to clamp the blade, be sure they and the mating threads are clean and in good condition. Use a torque wrench to tighten the bolts, so they all apply the same amount of pressure to the clamp. Set the torque wrench to a value that is appropriate for the size of the bolt. When torquing the bolts, start with the center of the holder and alternate side to side out to the ends
 - Blade to anilox alignment is critical and should be checked periodically. If using either a blade holder or chambered ink system, the doctor blade(s) should contact the anilox roll evenly across the face of both blades at the same time in chambered setups (Figure 3). If there is any misalignment in any axis, extra pressure will need to be applied to get the blade(s) to seat properly and provide a good wipe. Extra pressure generally results in contact angles that are less than ideal and potentially cause print issues
 - Periodically inspect adjustment mechanisms, pivot points, air cylinders, bearings, etc. for damage or wear, and rebuild or replace them as needed
 - Plastic blades can be used in many applications but can be negatively affected by some solvent ink systems or high temperatures. Consult with your supplier or test a sample of the blade material with your solvent to determine any compatibility issues

- Always be sure the holder is well supported and firmly held by some device, so that it can't move while being worked on
- Never have two people working on the same chamber or holder at the same time
- Extract worn blades from the chamber or holder and discard them directly into a scrap container, per company policy. If the blades are too long to lay flat in the container, I would suggest cutting them into more manageable lengths. Avoid hand coiling worn blades. Loosely coiled doctor blades can spring out unexpectedly and cause injuries
- It is strongly recommended to keep blades in the protective packaging they were received in until they are used, and install them in your holder directly from these packages when possible
- Use approved edge guards on single blade holders when appropriate to avoid getting injured on those installed in holders that are waiting to be used on press. Guards also can prevent print defects caused by damage to blades due to accidental contact with other objects

I hope this article has provided some thoughts to consider on maintenance and safety as related to blade holders and blades. The old phrase, “The squeaky wheel gets the grease, doesn't really apply here, since a damaged or worn blade holder is not likely to squeak. However, if it doesn't receive the attention it deserves, it will squeak—in the form of increased costs due to print defects and lost production time.

Eventually, no matter how well the components have been maintained, they will need to be replaced. When that time arrives, don't hesitate to replace your old components with a newer model. ■

SAFETY SUGGESTIONS

Safety is very important when working with doctor blades. Here are some things to consider regarding doctor blades and holders. The information presented here is only intended as a general guideline. Always follow your company's safety rules and procedures at all times.

- A common misconception is that a plastic doctor blade can't cut you. Although it is much less likely, plastic blades still have sharp edges, sharp enough to cut skin. And that doesn't only apply to the edge—watch out for the corners, too
- New and used doctor blades must be handled with care when being installed or removed from holders. Approved cut resistant gloves should always be worn when handling doctor blades. This is very important when working with chambered blade holders: It is never a good idea to put bare hands between the two worn blades of a chambered blade holder

About the Author: Bill Warner is the vice president of Allison Systems Corporation. Throughout his 27 year career with Allison, he has been involved in the application of doctor blades and doctor blade related components for various printing processes. Specific areas of experience include doctor blade sales, tech support, training and R&D, as well as the design of custom retrofit doctor blade holders and systems. He has a B.S. degree in mechanical engineering from Drexel University. Bill can be reached at 856-461-9111 or wjwarner@allisonblades.com.

