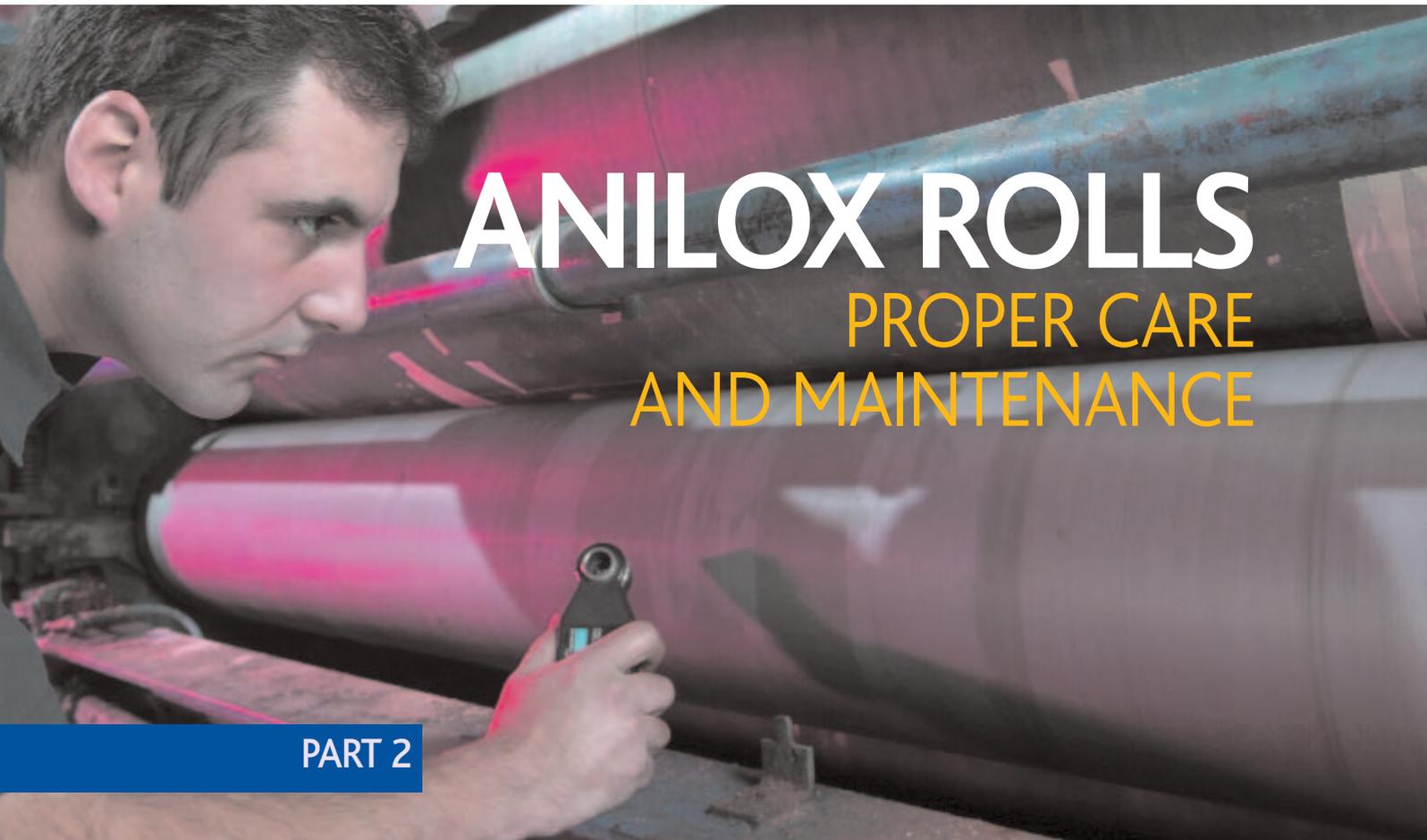


Ninety percent of all anilox rolls being refurbished today have not completed their normal life cycle of three to five years. The second and final part in this series discusses cleaning and maintenance. By Brian Jacob, Praxair Surface Technologies, Inc.



ANILOX ROLLS

PROPER CARE AND MAINTENANCE

PART 2

It is important to recognize that anilox rolls require strict cleaning maintenance procedures. If rollers are not properly cleaned after use, the cells will become clogged with dirt, dried ink, and other coating residue, which will build up in the bottom of the cells decreasing their print density. This will result in color matching difficulties.

For a daily cleaning regimen, it is important to use stainless steel brushes, or anilox pads, in conjunction with a cleaning agent recommended by your supplier. After draining the system, a small area of the roll should be brushed vigorously in a circular motion. The area should then be flushed with clean hot water and wiped with a lint free cloth. Any moisture remaining in the cells may be dried with alcohol.

Brass brushes should never be used to clean the surface of an anilox cylinder. Brass is too soft and transfers to the ceramic surface, further clogging the cells and affecting ink transfer.

If rollers are not cleaned properly and deposits become too thick and dense, more aggressive cleaning methods may be required, such as chemical wash, media blast cleaning, or ultrasonic cleaning. If rolls become severely plugged with foreign matter or doctor blade materials, nitric acid or sodium hydroxide may be used to remove these deposits.

For brass, stainless steel, hot rolled steel or polyethylene, a 40% diluted solution of nitric acid should remove any residue. It is imperative that caution be used when working with these acidic cleaning agents, as they can be dangerous.

Reviewing the Material Safety Data Sheet (MSDS) will provide a better understanding of the proper handling of the cleaner. In addition, safety goggles, rubber gloves, and a rubber apron should always be used. Keeping clean rinse water available in the event of a spill is also advised. Harsh chemicals are capable of attacking the steel substrate of the roller and therefore it is advisable to clean a small area at a time, being sure to neutralize and rinse the area thoroughly in order to prevent corrosion.

Keep an Eye on Your Edges

The straight edges of your anilox rollers will chip as a result of improper handling during uncrating or installation in the press. These chips are then susceptible to corrosion during cleaning, or if your inks run out of the normal 8-9 pH range. Chipped edges will also cause end seal wear, premature wear of your doctor blades, or ink slinging.

There are several options available to the pressroom to reduce chipped ends. Anilox roll covers protect not only the edges, but also the roll surface from damage when not in use. A second option is to radius the edges, typically 1/32 inch, which will not normally affect your doctor blades. Cylinders may also be manufactured with stainless steel shoulders that not only absorb mechanical impact, but also help prevent edge chips. In the event the edge of one of your rollers does become chipped, epoxy patches should be applied as soon as possible to prevent further damage and corrosion.

Bearing surfaces should be checked regularly for wear and/or excessive runout by using a dial indicator while the roll is slowly rotated. All rolls should be in static balance; while rolls running over 300 rpm should be dynamically balanced.

Anilox Rolls Don't Last Forever

Designers need to realize that even with good maintenance procedures in place, anilox rolls will eventually begin to show signs of wear. In addition, there are several circumstances that will accelerate wear if not properly addressed.

As the industry moved away from the rubber doctoring rolls and began using the more precise reverse angle and chambered blade systems, anilox cylinders were subjected to more abrasion. If you exceed OEM blade pressure settings, you will certainly expose your rollers to excessive wear.

Plastic doctor blades, as well as composite blade materials, are commonplace in today's press room, primarily due to the safety advantages over metal blades. However, even plastic blades are capable of producing enough heat and friction to damage an anilox roll surface. Running rolls "dry" without lubrication will

exponentially amplify wear damage. It should be noted that water alone is not considered a satisfactory lubricant. Ink, soapy water, or cleaners specifically designed for anilox rollers are the only liquids recommended for an auto wash-up system.

Choosing a Doctor Blade

In choosing the type of blade to use for your press, many designers believe plastic is the logical choice. However, plastic blades are more susceptible to pick-up of contaminants from the printing system. These particles lodge in the soft plastic edges and form a sharp cutting ridge. The result is a perfectly formed score line around the circumference of the roll.

These embedded particles often include dried ink due to improper maintenance, ceramic particles which will slough off the roll surface, often as a result of substandard laser engraving or finishing procedures, or ceramic particles from cell walls broken down due to foreign materials.

What Causes Score Lines?

Proper maintenance and equipment are invaluable in preventing score lines. If you do not use filters or screens on your ink buckets; do not use magnets in the ink train; or have a filtration system that does not screen out trace materials from your water supply, you will be vulnerable to scoring. Also common are steel slivers from metal blades when excessive pressure is applied.

In the corrugated market, recent studies have indicated that metal particulate on the sheets is being carried to the anilox roll. It appears certain that these metal particles are the result of knives being sharpened on the corrugator, with the resulting dust particles falling onto the sheet. This serious problem is being addressed by both OEMs and aftermarket users as today's sheet cleaners are well designed to handle paper dust, but not metal. Even sheet cleaner brushes have been seen to "load up" with material particulate, which eventually falls back on the sheet.

Why is all of this information important? Because 90% of all anilox rolls being refurbished today have not completed their normal life cycle of three to five years. More often, they are being reconditioned due to damage, plugged cells, or premature wear caused by neglect.

Which Engraving Will Work For You?

If a designer has concerns as to which engraving will offer him the best graphic impressions, he will benefit by running banded anilox roll trials prior to the selection of a final engraving. A correctly designed banded anilox roll has remarkably beneficial results, as it

Printing Improvements

will allow a designer to improve, control, and optimize his printing process.

Proper testing also gives the designer the knowledge necessary to better understand the engraving process and to determine the way selected input affects the responses and results (such as print density, dot gain, contrast, trapping, etc.). By analyzing the test data, the designer will be able to accurately predict future results and provide accurate statistical information without having to conduct additional "on off" tests. Banded testing also offers a realistic indicator of actual pressroom output.

Prior to selecting a banded test roller, it is important to consider factors that might distort test results. Without a full understanding of the data produced by the banded test roll, the test results could be useless. For example, misleading assumptions will be made if there is improper control of blade pressure, press speed and impression. Electing to engrave too many bands on one roller is another mistake which will result in "clutter." Therefore, it is preferable to set upper and lower limits of your test bands, rather than attempting to specify every conceivable combination of screen count and volume. For example, instead of using a single fixed volume and six different screen counts (for example, 500 lpi, 600 lpi, etc., up to 1000), it is more effective to use two upper screen counts and two lower screen counts of 500 lpi and 1000 lpi. The results will indicate an optimum screen count and volume combination for the test application.

Another mistake often made when specifying a banded test roller is to ignore the relationship between anilox volume and screen count. If the designer attempts to fix one variable (for instance, volume), while changing the other variable (screen count), it does not allow the ability to isolate and observe the relationships between them. All screen counts have an optimum volume, and attempting to exceed that parameter is inevitably counter-productive.

Due to fluctuations associated with gauge capability and natural process variations, potentially significant factors could be missed.



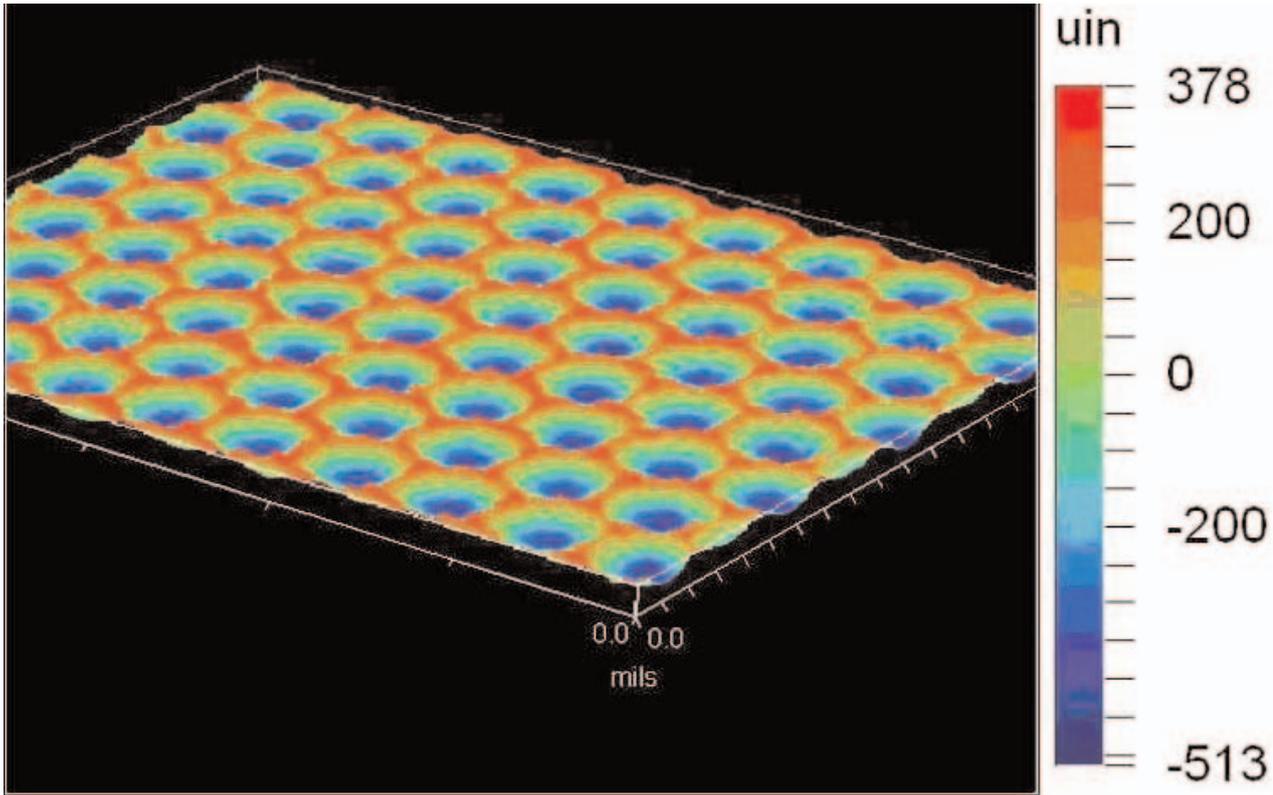
For example, press speed may only be controllable to +/- 10%, which would have a definite effect on the results of a banded test roll. When a designer is uncertain of which engravings will be the most beneficial to test on a banded roll, sales engineers are able to assist him in making the correct choices to achieve maximum benefits from the test run.

Measuring Engraving Volume

The ability to measure the accuracy of theoretical cell volume of laser engraved ceramic anilox rolls has provided a challenge to the industry since product inception. The solution requires the need for scientific accuracy, with competent and consistent results. Pocket scopes or more expensive gravure scopes work well within the pressroom environment to identify wear or plugging problems.

Most anilox roll manufacturers utilize the newest computer-controlled, vertical scanning optical profilers which operate on principals of white light interferometry, which measures height differences as small as 0.1 nanometer (or .001 micron). Within a field of view as large as 48 sq mm, this system will make in excess of 60,000 depth measurements. By analyzing this data, the computer creates an ultra-high resolution contour map of the engraved surface and calculates average screen angle, lpi, depth and cell volume. This gives manufacturers the ability to better control the engraving process.

Another popular and accurate method utilizes the use of a liquid volume measurement system which gauges the ink carrying volume of an anilox roll. This system, which is easily used in corrugated press rooms by trained personnel, relies on placing a measured amount of ink on a portion of the engraving to be tested, spreading the ink with a calibrated doctor blade until the volume of ink has uniformly filled a number of the adjacent cells. The ink is then transferred to paper by blotting. This ink blot is subsequently analyzed to determine its area. The volume per square inch is easily calculated without the aid of mathematical algorithms, as the volume of ink that created the blot is known. This method



directly relates to cell volume, and considers the surface tension of an individual roll.

Knowing the accurate ink cell volume of each anilox roll in a corrugator's inventory offers many advantages, including the ability to select the correct roller for a specific application, as well as guaranteeing the best print quality for that application.

Roller identification programs have gained enormously in popularity due to the many advantages they offer the printer. Rollers are engraved with identifying information, such as the date engraved, serial number, line count and volume, as

well as any other information of importance to the customer. All data is engraved in the dead band area of the cylinder. Roll identification offers the ability to change rollers quickly and efficiently, with little or no guesswork as to the correct roller to use.

Each laser engraved ceramic anilox roll is shipped to the customer with a Certification, which specifies important data unique to each cylinder. It is important to keep these Certifications with the records of your roller (especially if a roll identification system is not utilized) in order to document, among other statistics, the date on which the roller has been engraved. Magnetic decals or identification tags are also very popular and can be used to help keep track of which anilox rolls are in use and at which particular print station.

Basic Maintenance and Control

Finally, it is vital to remember to:

- Document doctor blade material and thickness;
- Inspect and clean chambers and ink pans regularly;

- Check alignment and clamping bolts;
- Use magnets and filters on all stations;
- Record all cleaning and maintenance procedures for each roll;
- Pay attention to blade pressure;
- Never allow an anilox roll to run dry — always use a lubricant.

In order to control the variables associated with anilox roll volume, it is essential that press room employees are in control of all the elements that are capable of affecting the ink carrying capacity of the anilox roll.

The Future

The future of the corrugated market offers unlimited options to achieve excellence in graphic design and innovation, and the laser engraved ceramic anilox roll is the tool to lead the way. A new generation of improvements is on the horizon for corrugators, with no

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boundaries on the technical advancements being made in the industry.

Only a few years ago, no one would have even considered the possibility of corrugated presses running anilox rolls with 1000 lpi, but today it is not uncommon. The next decades offer the promise of even more amazing technological achievements. By understanding the benefits an anilox roll brings to the industry, today's designer is able to improve the quality of his product. At the same time, the anilox manufacturer is leading the marketplace in development of new innovations that will benefit future generations of the corrugated printing market.

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