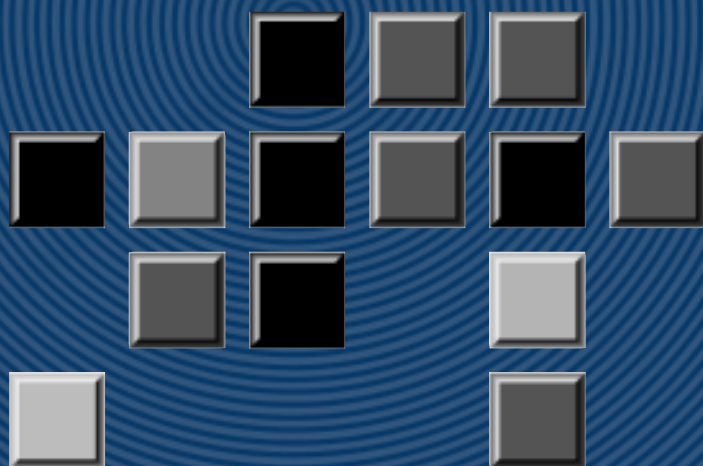


Guidelines to Better Printing

with dayGraphica™ blankets
and Varn Chemicals



Guidelines



DAY INTERNATIONAL, INC.

Image Transfer Group





Introduction

To our fellow pressroom professionals and customers: this offset printing blanket and chemical overview is provided to give the press operator a basic understanding of printing blankets and chemicals and enhance their ability to produce trouble-free, high quality print jobs.

The information is excerpted from materials used by Day International's Technical Support and Pressroom Training Team.

If you have a specific problem or question that is not answered in the following materials, you may contact Day International's Technical Support by calling our Customer Service Department at 800-877-8187, ext. 0.

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Purpose of Blankets

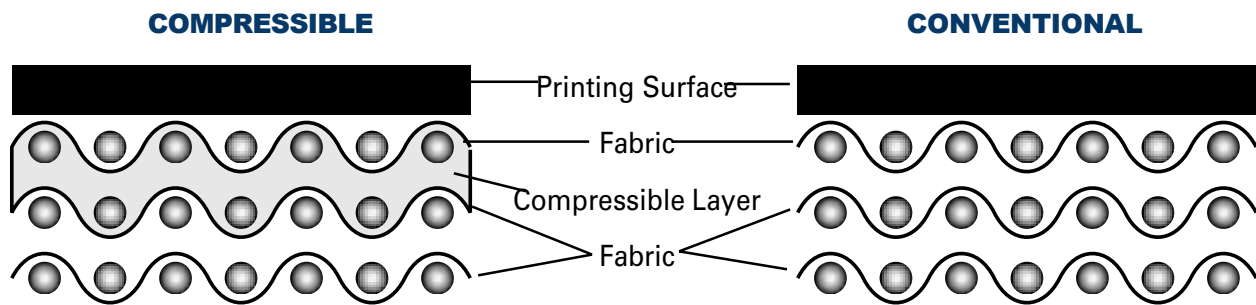
The offset printing blanket is the most important element in the offset printing process. It's the final point of contact between the press and the printed substrate. The purpose of the blanket is to transfer the inked image from the plate to the substrate without any distortion of the image in its original form; so selecting the proper blanket for your particular application is a critical factor in obtaining optimum print quality. Inferior blankets or improper blanket techniques can cost you money in down-time, waste and quality. They eventually can cost you valuable customers.

Blanket Types

There are two basic types of offset printing blankets — compressible and conventional. Compressible blankets are the most popular blankets today because of better smash resistance that results in longer life and wider packing latitude. This allows the blanket to be slightly over or under packed and still produce acceptable print quality. Compressible blankets contain a cellular sponge-type layer that functions in a manner similar to a shock absorber.

Conventional, or non-compressible blankets continue to be used today in applications where high print pressures are required. Conventional blankets are sometimes referred to as “hard” blankets. They require precise packing methods and offer very little packing latitude.





Blanket Construction

Offset printing blankets are typically constructed of two basic components—a carcass and a surface layer.

The Carcass

The carcass, or body of the printing blanket, is usually made up of several layers of fabric (ply). The layers are laminated together with adhesive rubber cement and, in the case of a compressible blanket, a compressible layer.

The fabric layers, which can range from as few as two-ply to as many as five-ply depending on thickness requirements, are specially designed for offset printing blankets and contain natural and synthetic fibers.

Each layer or ply of fabric in the blanket may have its own unique physical characteristic. The adhesive cements are designed to have high bond strength along with resistance to a wide variety of pressroom chemicals.

The compressible layer in **dayGraphica** brand blankets is composed of tiny air bubbles created by the use of micro-spheres surrounded by a resilient synthetic rubber compound. This 'closed-cell' type of compressibility offers a very even distribution of air cells throughout the compressible layer which provides consistent print pressures as well as excellent recovery in the event of a blanket smash. Additional benefits provided by a compressible blanket include:

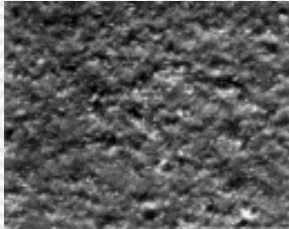
- Reduced plate wear
- Reduced mechanical problems (gear vibrations, etc.)
- Increased packing latitudes (for varying stock thickness)

The Surface Layer

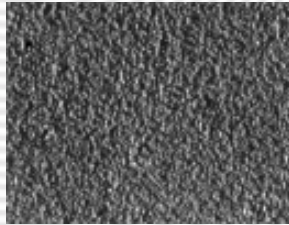
The rubber compound and finish of the blanket surface plays an important role in determining the blanket's print quality characteristics. Blended, synthetic rubber compounds are used because they can be formulated to be compatible with various inks, fountain solutions and washes.

Synthetic elastomers have replaced the natural rubbers previously utilized in the surface or "face" of the blanket. The type or blend of elastomers used in a blanket depends on the intended application. In addition to the type of synthetic rubber compound, the blanket's texture or surface finish also plays an important role in the performance of the blanket.

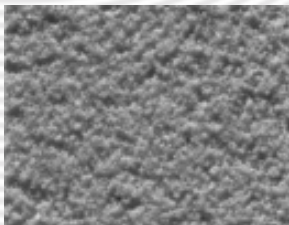
Offset Printing Blanket Overview — continued



**dayGraphica
8500**



**dayGraphica
3000**



dayGraphica 9500

There are three different types of surface finishes:

1. **Cast Surface**—a finish produced by using a special type of paper inter-leaved against the rubber face during the curing process. It's a common blanket surface finish characterized by a smooth, shiny appearance.
2. **Ground Surface**—produced by a mechanical grinding process after the blanket has been cured. It requires an additional manufacturing step but allows the manufacturer to achieve the close thickness (gauge) tolerances and offers various degrees of roughness profiles on the blanket surface for different printing applications.
3. **Textured Surface**—a surface finish produced through a chemical process. This process is an exclusive Day International patented process, which produces a cast surface blanket without talc and with the option of various degrees of roughness. This surface texture, in combination with the face rubber, is widely accepted as having the best release characteristics of all blankets.

The three surface types offer different advantages to the printer. For best printing results, it's important for the printer to determine which surface finish is best suited for the particular application (the blanket manufacturer should be able to provide guidance in this issue).

Important Physical Characteristics of Blankets

- **Compressibility**—rubber by itself displaces when force is applied, so air has to be trapped inside it to allow it to compress.

Compressibility is the blanket's ability to reduce in volume under pressure and then rebound to its original state. Compressibility also allows the blanket to exert approximately equal amounts of point pressure over a range of packing levels.

- **Tensile Strength**—an important characteristic of the fabric in a printing blanket is its tensile strength. Since most printing blankets are tensioned on the blanket cylinder, they must be able to resist breaking at high levels of force or tension.

Tensile strength is a measure of the break strength of the blanket. The design of the fabrics and the number of fabric plies in the blanket affect its tensile strength.

- **Stretch**—another important blanket characteristic is the percentage of elongation under a given load. It's vital for a blanket to have a small amount of stretch or elongation so that it will conform to the blanket

cylinder. Precise control of blanket stretch characteristics is critical to ensure consistent installation of the blanket on the press.

It's recommended that torque wrenches are calibrated and pre-set to blanket and press specifications when tension is applied to the blanket.

- **Surface Hardness**—it's necessary to differentiate between surface hardness and blanket durometer. Because of the proximity of fabrics near the face of the blanket, blanket durometer (hardness measurements) of the blanket can be misleading when measured with a hand-held shore durometer.

It's likely if you measure two blankets, each with a very different surface hardness, your readings will be very similar because of the fabric influence on the reading of the overall blanket. A more accurate measurement of the surface hardness is obtained by using a micro-hardness tester.

- **Surface Roughness**—the surface profile of a printing blanket has a direct effect on its print quality characteristics. A rough surface blanket offers excellent mechanical release properties but will transfer a somewhat jagged-edged dot. A smooth surface will produce better dot structure but with less mechanical release. The surface roughness of a blanket is typically reported as an average value and measured with a Profilometer.
- **Thickness**—an offset printing blanket should be uniform in thickness. Typically, cut blankets less than 42" wide should vary no more than .001". When measuring the thickness of a blanket, be sure to use a constant force micrometer or a gauge designed and calibrated to measure blankets or soft materials. Measure the blanket, rubber side up, in at least three locations on each end and side of the blanket.
- **Squareness**—due to the directional, low-stretch characteristics in the "around the cylinder" direction of the blanket, it's important the blanket is cut square. Measure the blanket from opposite corners to check for squareness. Variation should be no more than 1/16". Blankets cut out of square will not tension properly on the press and may possibly cause print related problems and web control problems such as wrinkling.
- **Solvent Resistance**—blankets are exposed to a wide variety of chemicals in the pressroom. They must be able to resist swelling and delamination caused by inks, fountain solutions and washes. (Day International offers controlled laboratory chemical compatibility testing for all of your pressroom chemicals. Refer to Chapter 5 — Varn Product Overview.)

Blanket Characteristics

Not all printing blankets are created equal.

Although printing blankets may appear similar on the surface, there are a number of factors to consider when selecting the proper blanket for your press and printing application.

Printing blankets have many physical properties that vary depending upon the manufacturer and the blanket style. Characteristics such as:

- print quality
- release
- durability
- ease of cleaning
- ease of installation
- ease of removal

All these properties should be considered when trying to decide on the best blanket to suit your printing needs. The best assurance of choosing a quality blanket is to buy from a reputable manufacturer that can consistently supply you fresh products with uniform quality in every delivery.

Some additional features of a high quality offset printing blanket should include:

- **Identification marking**—on the fabric side of the blanket, there should be a way to identify the manufacturer and the style of the blanket. The markings should include:
 - name of manufacturer
 - roll lot number
 - blanket style
 - size (around x across)
 - blanket gauge (thickness)
- **Color stripe woven into the fabric of the blanket**—these color stripes identify the manufacturer and indicate the direction in which the blanket should be mounted on the cylinder. **dayGraphica** blankets display a gold color fabric stripe on every blanket. The fabric stripe should go around the cylinder, not across.
- **Bars or end treatments**—generally your blanket supplier can provide blankets with bars already attached. These bars should be neatly and securely attached to each end of the blanket without any excess epoxy or residue on the surface or fabric.

If your blankets require holes or have to be punched, these holes should also be neat and aligned properly on the ends of the blanket. For all blankets, squareness is important. Be sure to check all blankets to make sure they are cut properly.
- **Rubber surface color**—the pigment used to produce different colors of printing blankets usually does not affect the performance of the blanket. However, extreme color variation within an individual blanket or blankets of the same style but from a different roll lot number may indicate aged or inferior quality blankets. Slight color variations are



common with all rubber products, but if the variation is significant, it is recommended you check with your supplier before using the blanket.

Although the color of the rubber, for the most part, is irrelevant to the performance of the blanket, certain surface colors can aid the printer in reverse image inspection and troubleshooting.

- **Edge Sealants**—at the request of the customer, a water and solvent resistant coating can be applied to the edges of the blanket. This will help keep moisture from penetrating the carcass of the blanket and prevent swelling and delamination.

The sealant should be applied only to the edges of the blanket with no excess on the surface or fabric side.

Evaluating Blanket Performance

It's difficult to predict performance results of a printing blanket for each pressroom application because of the many variables that contribute to the performance of the blanket; variables such as:

- press mode
- fountain solution
- type of ink
- press operating procedures
- paper stock
- press speeds

All these variables play a part in the performance of a printing blanket. So, it's important that you work to determine which blanket best suits your individual needs.

Here are some of the items that should be considered when evaluating the performance characteristics of an offset printing blanket.

- **Print Quality**—the print quality produced by a printing blanket is probably the most critical characteristic to consider. Blanket test comparisons should be obtained from information gathered on new blankets currently being used and on new blankets that you wish to test.

If test information indicates improved results from the test blankets, continue production and evaluate longevity and endurance between the styles of blankets currently being used and the new test style blankets (print quality of a blanket sometimes changes after it has been on press for awhile).

There are several testing methods available today. For an accurate comparison of the print quality of two different blankets, it is recommended that you decide on a test form to print—whether it is the current job you are running on the press or an actual standard print quality test form.

The test should contain color bars and any additional print quality targets that will provide relevant information. Start the press using your current blanket(s) installed to correct specifications (use preset

Offset Printing Blanket Overview — continued

torque wrenches), collect acceptable printed sheets and then stabilize the press.

Once this has been accomplished, stop the press. Change only the printing blankets. Make no other adjustments on the press. Restart the press and after making 'fine tuning' adjustments, collect acceptable printed sheets.

Compare:

- solid ink densities
- dot gain values
- print contrast values
- solid ink traps
- dot structures
- quality of solids
- any additional measurements deemed necessary

Make note of any major press adjustments that had to be made during the test. If acceptable results are achieved, it's recommended you continue running the blanket on different printed forms to collect more data for further evaluation.



- **Release**—blanket release characteristics are not easily measured. But when a blanket has poor release properties, it is easily detected. Poor blanket release can cause problems such as:
 - dot distortion
 - poor registration
 - blanket piling
 - hickeys
 - streaks or lines in the print and paper
 - substrate distortion

There are two ways to improve the release properties of a printing blanket. One way is by chemical means. The other is by mechanical means.

Chemical release characteristics are determined by the chemical composition of the rubber surface. The surface of the blanket and construction of the carcass determine mechanical release properties. Chemical and mechanical release properties can often compliment each other.

For a printing blanket manufacturer, it can be difficult to produce blankets with both excellent print quality and release characteristics because the two properties sometimes work against one another.

Example: a blanket with a smooth surface may transfer a very sharp dot to the substrate; but its mechanical release properties may suffer because of the greater surface contact between the blanket and the substrate. Therefore, the blanket would require excellent chemical release properties to compensate for the deficiency in the mechanical release properties.

When evaluating release characteristics of a blanket, you should check for the following problems:

- Excessive web flutter that can't be corrected with web tension
 - Uneven marks or lines in the print
 - Excessive sheet curl on a sheetfed press
 - Poor registration between units
 - Excessive paper and/or ink buildup on the blanket surface
 - Poor print quality (dot distortion, smoothness of solid, loss of detail)
- **Durability and Longevity**—seldom do printing blankets stay on the press long enough to wear out. Blankets are usually changed because they have been damaged in some way and no longer produce acceptable print quality.

A printing blanket can be damaged in a number of ways.

Problems such as a smash caused by a wrinkled sheet or web break, changes in web or sheet size, foreign material passing through the press, poor blanket maintenance and improper packing or tensioning procedures are just a few examples.

A blanket can be repacked with new or additional under-packing and not have to be changed. Although there are many temporary “repair” products and methods to swell or rejuvenate a damaged blanket, these repair methods are only temporary at best. When a blanket is smashed or damaged, eventually it will have to be changed.

Press downtime incurred in trying to repair a blanket and the possibility of inferior print quality caused by a damaged blanket can sometimes far exceed the cost of a new blanket.

It's recommended you keep a printing blanket record or logbook at each press to track printing blanket usage. The record should include the following information:

- style and blanket manufacturer
- installation and removal date
- blanket gauge
- packing thickness
- press unit position
- total number of impressions
- reason(s) for removal

You may want to include additional information. A blanket record or logbook will be valuable in troubleshooting problems, evaluating blanket performance and providing detailed information on blanket consumption.

(Day International can provide charts or help you develop a tracking system for your pressroom.)

Proper installation and packing of the offset printing blanket is the foundation for consistent print quality and blanket performance. Here are guidelines to remember:

Proper Gauges—having the proper gauges to measure blanket and under-packing is essential. Properly calibrated and well-maintained gauges will quickly help you determine blanket-related print problems.

Packing—one of the most misunderstood, yet critical elements, is packing. When under-packing, you should know three things:

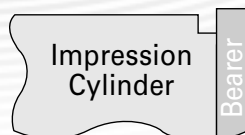
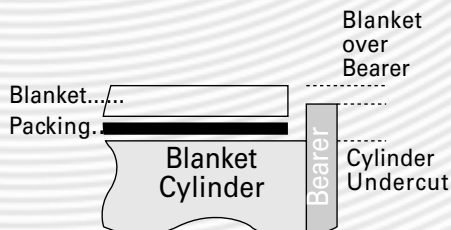
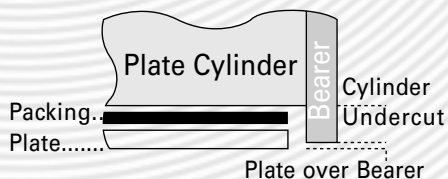
- blanket thickness
- required packing thickness
- required print measures

Packing height is important because the ideal packing height delivers optimal print pressures and enhances the following properties:

- print quality
- resistance to piling
- blanket life
- smash resistance
- release
- plate wear
- tension control and feed
- registration

Improper packing can have a negative effect on any or all of the above. And, there are certain printing problems that can be caused or aggravated by improper packing, such as:

- | | |
|-----------------------------|-------------------------|
| • Weak print | • Poor Register |
| • Pinholes | • Pressure wrinkles |
| • Piling | • Sheet/web release |
| • Poor trap | • Web control (tension) |
| • Emulsification (mottling) | • Web breaks |
| • Slurring | • Excessive plate wear |
| • Dot gain | • Plate cracking |



- **Undercut and Iron-to-Iron Settings**—the undercut and iron-to-iron settings are two of the most important press specifications on the printing press. All packing and print pressures are set in reference to these two specifications. Ideally, these specifications should be posted on or near the press, so that decisions can be made quickly and accurately.

Improper blanket packing is a common problem that leads to poor print or press performance. There are no packing guidelines that apply one hundred percent of the time. However, knowing the blanket gauge and packing thickness and print/squeeze pressures will alleviate most pressure-related problems.

Again, packing heights are dependent upon the following:

- Type of press
- Bearer or iron-to-iron settings
- Basis weight; type of paper being used
- Type and brand of blanket being used
- Tensioning and torquing procedures

Steps to proper packing:

1. **Know the undercut** of both the plate and blanket cylinders. If you do not know this dimension, check the press manual or measure the cylinder with a packing gauge.
2. **Measure the thickness/gauge** of the blanket and the under-packing, as well as the plate and under-packing. Don't assume the product information stamped on the back of the blanket is correct. Measuring takes very little time in relation to the problems that may occur during a press run.
3. **Allow extra packing** to compensate for blanket stretch and "run in." All blankets will stretch, losing gauge anywhere from 0.001"-0.002".
4. **Use a packing gauge** to properly check blanket height to help you to determine the proper squeeze pressure.
5. **Adjust the packing** to best accommodate your printing conditions and requirements. To achieve the best results from your press, it's crucial for you to learn the variables and their associated measurements.

NOTE: To achieve optimum print quality, bearer pressures must be set after the blankets and plates are packed to the desired heights.

- **Blanket Tensioning**—this procedure is critical to attaining top quality print and consistent performance. Proper torquing, along with proper packing procedures, will provide quality results in print values, registration, tension control, sheet release and overall blanket life. Torquing gives you consistency not only from unit-to-unit, but uniformity around the whole cylinder.

Blankets On The Press — continued

Example:

To Calculate Packing Height of Blanket		English	Metric
Desired blanket height above bearer:		.004	0.10
Blanket cylinder undercut:		.081	0.06
	Subtotal	.085	2.16
Blanket thickness (subtract):		.077	1.96
	Subtotal	.008	0.20
Add .001 to .002 for draw down:		.002	0.05
Packing Thickness Needed:		.010	0.25
Blanket Thickness:		.077	1.96
Calculated Total Packing Height:		.087	2.21

Plate:	.001	above bearer
Blanket:	.004	above bearer
Total	.005	total plate-to-blanket squeeze

Blanket:	.004	above bearer
Blanket:	.004	above bearer
Total	.008	total blanket-to-blanket pressure plus paper caliper

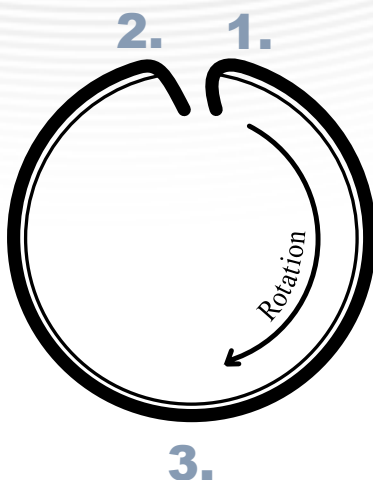
Blanket Tensioning

Measuring the blanket on the press is accomplished several ways using several different types of gauges. The number one priority should be to have a gauge that provides accurate and repeatable measurements.

Gauges should be handled carefully and kept clean, calibrated and in a secure case or cabinet when not in use. Remember that the blanket is the heart of the press—every adjustment that is made on a press is reflected in the blanket's performance.

When measuring blanket thickness on the press, always wash the blanket first. Ink buildup, paper dust and coating on the blanket can affect the accuracy of the readings. These critical measurements are in thousandths of an inch, so the reading has to be exact.

There are three critical areas on the blanket that must be measured while the blanket is on press. These areas will determine if the blanket is installed properly and whether the correct height has been obtained to achieve the correct print pressure. The three areas are:



1. lead edge of the blanket at the gap

2. trail edge of the blanket at the gap

3. half gap or 180° from the gap

If the three measurements are within .0015" in these three areas, the blanket is circular. If these measurements have a greater range, then the blanket is egg shaped (due to over-tightening).

When blankets are improperly tensioned, several problems may occur. Poor register, feed, release, susceptibility to smashes and on-press damage may result. All of these problems shorten blanket life and affect performance.

When installing blankets on presses with double reel rod lockups, be sure to insert the same length of blanket in both ends. Tighten both sides at the same time to insure the blanket is stable or square on the cylinder.

On presses that only have trail end reel rod lockups, it is easy to over-tighten one end and create a "step" from the lead edge to the trail edge. This can cause register problems, "gear streaking" or "cylinder bounce" on the printed sheet.

No-Pack Blankets

It's important to be consistent when tensioning or torquing no-pack blankets. When printing blankets are over-tightened, the gauge is lost quickly.

With no-pack blankets, there is no option of "packing up." Extreme care should be exercised when installing no-pack blankets. A quick check with a packing gauge will ensure proper installation and avoid subsequent printing problems.

Torquing No-Pack Blankets

Torquing is recommended in all applications—using a torque wrench when installing the blanket allows consistency and avoids problems related to improper tightening. Following are the recommended torquing procedures:

- | | |
|-----------------|--|
| Step I | Install the blanket as usual. Use a torque wrench set to recommended specifications |
| Step II | With the press set "impression on", run the blanket around 3 to 6 times; leave press set to "impression on" and retighten the blanket. Now the blanket should be very snug |
| Step III | Set press to "impression off" and re-torque the blanket |
| Step IV | During the first press stop, re-torque the blanket |
| Step V | The blanket is now torqued—further tightening should not be needed unless a printing problem is evident |

Tips on Torquing

- Make sure torque wrench is calibrated to proper setting
- Keep blanket lockups in good working condition
- On presses equipped with double-reel rod lockups, torque both sides of the cylinder at the same time
- Check blanket height after installation

Procedure for Lengthening or Shortening Print

The rule is:

- To lengthen print—take packing from plate cylinder and put it under blanket
- To shorten print—transfer packing from blanket cylinder to the plate cylinder
- Always maintain the same squeeze pressure

Troubleshooting Print Problems

When troubleshooting to identify the source of printing problems, some specifics should be checked. Following are “vital signs” to check:

- Verify undercut or iron-to-iron settings and bearer settings
- Verify blanket gauge and packing thickness. Don’t assume the gauges indicated on the blankets are correct - **measure them!**
- Verify the blanket height on the problem cylinder and measure it in the three critical areas (lead edge gap, trail edge gap and half gap). The blanket should be inside of .0015" in all three areas
- Review blanket installation procedures
- Review torquing and tightening procedure
- Check bench packing of blanket or what gauge blanket and packing thickness are being used to obtain desired blanket height on press after tensioning
- Check gauge of new blanket on press

The above steps should identify problems with the printing blanket or the packing. If all these areas appear in good order, check the other press unit systems for possible causes. The most common blanket problems are:

- Over-tightening and improper tensioning of blankets
- Improper packing procedures

**Remember...
proper
procedures
provide good
results and
save time and
money!**

- Poor blanket maintenance
- Major mechanical (blanket lockups - bearer/iron-to-iron settings)
- Incorrect blanket specifications (wrong sizes/bars)

Establishing Procedures

Always maintain specific procedures to achieve consistency. Procedures are put into place to eliminate costly mistakes and provide a baseline to correct problems through certified change.

The printing blanket is the final component in achieving quality printing. Understanding the principles of the blanket and its role in the printing process will ensure high quality, performance and consistency.

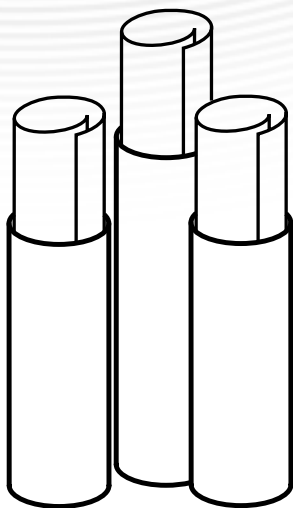
Proper care of the offset printing blanket can be a deciding factor in its successful application and use.

Storage and Handling Do's And Don'ts

- Upon receipt of new printing blankets, check to ensure that the blankets are the correct style, length, width and thickness. Make sure they have been punched and barred as required.
- Whenever possible, store printing blankets in the original shipping tube or carton. These containers will protect the blankets from being exposed to light and from the abuse that can occur in normal storage and handling.
- Don't force more than the original quantity of blankets into the shipping tube or carton. This may cause stress or wrinkles in the printing surface—the type of damage that can eventually show up on the printed sheet.
- If you must store the printing blankets flat, out of their shipping tube or carton, lay the blankets face-to-face and fabric-to-fabric. Cover the blankets to shield them from dirt and light.
- When storing printing blankets out of the container, do not remove the tape from the bar ends of the blankets. The tape is applied to protect the printing surface from possible scratches.
- When handling the blankets, do not create sharp bends or folds in them. This may cause surface defects that can also show up on the printed sheet.
- Store printing blankets in a cool, dry, clean area. This will protect them and ensure that they are usable when needed.

On Press Do's and Don'ts

- Follow all safety rules and precautions when installing the blanket.
- Make sure the blanket and blanket cylinder are free from any foreign material.
- Tension the blanket properly with a calibrated torque wrench or torque limiter. Over-tensioning may result in premature blanket failure and under-tensioning may result in print problems.
- After installation, hand-wash the surface of the blanket with warm water to remove any powders or dust that remains on the surface of the blanket. This will allow for a much faster and trouble-free start-up.
- Clean the blankets as often as practical. This will help eliminate possible ink build up at the gap or outside the printing area.
- Don't use ink knives or other sharp tools in cleaning the blanket. These items can damage the blanket surface.
- Use as little blanket wash as possible. Excess wash can soak into the back of some blankets causing them to swell.
- If using automatic blanket washers, make sure they are set properly at all times. Incorrect settings can damage the surface of the blanket.
- Use only solvents or washes that are formulated specifically for blanket cleaning. Harsh solvents may cause face swelling and they may actually soften the rubber on the blanket face, making it sticky. This will contribute to poor paper release.





- There are many reasons why you should be conscientious in the selection, use and care of offset printing blankets. Since the blanket is the final point of contact between the press and the printed substrate, it has a direct effect on your printing quality.
- Blankets should be viewed as an investment. Inferior printing blankets and poor usage techniques can cost you money in downtime and can eventually cost you valuable customers.
- Since printing blankets directly influence dot reproduction, proper selection, careful mounting and packing can make a tremendous difference in the quality of your printed job.
- A printing blanket's condition, as a result of use, affects printing. Low spots, glaze or dry ink buildup (caused by poor washing procedures), tackiness (caused by the use of harsh washes), embossing or debossing (caused by incompatibility of pressroom chemicals) may all affect your reproduction quality.
- Improper packing can also seriously affect printing quality: a difference of as little as .0015" may result in a noticeable change of color values. It's important you check the gauge of the blanket and select the proper under-packing sheet to obtain the correct on-press blanket and packing height. Improper packing of the plate can also cause serious print quality problems. Always use a packing gauge to ensure proper printing pressures.
- Poor mounting or installation procedures of the blanket can cause problems. It's important to use a torque wrench when mounting blankets to prevent over or under-tightening that can cause excessive gauge loss or loose blankets on the press.
- Be sure the blanket cylinder is free of any debris or foreign materials that can cause high spots. If a blanket is loose on the cylinder, not only does the loose fit affect register and dot reproduction, but it also allows water and solvent penetration into the fabric backing of the blanket. This can cause swelling, uneven printing pressures and eventual blanket delamination.

Check with the blanket manufacturer or supplier for proper blanket torquing recommendations.

- With proper use and care, your blankets should produce hundreds of thousands of quality impressions. Pressroom conditions, practices and type of printing projects all affect blanket life.
- Types of presses definitely have an effect on blanket life. Only a careful and accurate count of impressions noted faithfully on a data chart will indicate true blanket life. Variables such as type of printed form, inks, papers, smashes and unusual conditions will have an effect on

blankets and should be noted. Solvents in washes should also be carefully considered.

- There are many important factors to be aware of when selecting a printing blanket. Factors like uniform thickness, surface texture, squareness, stretch characteristics, resilience, ink receptivity, release, chemical resistance and compatibility with other pressroom supplies should all be carefully considered when selecting the proper printing blanket for your application.
- Properties such as thickness and squareness can be checked before use, but it's not always easy to determine whether a problem is the result of improper care or poor blanket quality. Continued checking will determine the facts.
- Proper handling and care of printing blankets is good common sense. It's recommended that blankets are stored in the tube or carton in which they are shipped—the tubes are designed to protect the blankets from damage.
- Store the blankets in a dry, cool location of your facility—it's important to keep blankets away from moisture sources such as steam pipes, air conditioners or heaters. Moisture will affect the fabric and cause poor blanket performance.
- Avoid exposing the blankets' surface to direct sunlight or UV rays. Such radiation can cause blanket damage. If you prefer to store blankets on a shelf, be sure to lay them rubber side to rubber side and fabric side to fabric side.
- Opinions vary on how and when to wash blankets. It's impossible to establish hard and fast rules. Depending on the type of stock and ink used, a blanket may have to be washed more or less often. Obviously, a blanket should always be washed when it fails to transfer ink properly.

As a general guide, a blanket should be washed:

- Before it's used for the first time
- When print quality deteriorates or buildup is noticed on the surface
- When, for any other reason, the press stops for a length of time
- Before changing printed forms

A soft rag, or any soft, absorbent material which does not shed lint when soaked with blanket wash, is essential:

- Don't use too much solvent
- Start washing in the center of the blanket and work out to the edges
- Avoid excess wash on the edges of the blanket
- Remove excess wash from the blanket's surface with a clean, dry rag

Using proper care and maintenance techniques can extend printing blanket life. Remember, the printing blanket plays an important role in the quality of your work and the success of your pressroom.

The single most important step in ensuring continuous, high-quality output in the pressroom is a focused press maintenance program. Varn fountain solutions, washes and specialty products are formulated and field-tested for virtually every printing application, whether a large heatset web press, a mid-sized sheetfed or a small offset duplicator.

The following sections detail and describe each of these products and their recommended use in the pressroom.





Printing on a poorly maintained press is more than just a dirty job for most printers. Glazed rollers and blankets can cause major problems, such as improper ink transfer, which can lead to lower output and increased overall costs in wasted paper, ink, hourly wages, overhead and irreplaceable press time.

It doesn't matter how much you spend on pre-press electronics in an attempt to achieve the best image possible, if your rollers cannot transfer ink properly, the printed image will suffer. Keeping rollers and blankets clean helps minimize or eliminate these concerns. The following tips can help define maintenance parameters and assist in improving an existing maintenance program.

Solvents for Washing the Press

There are four basic solvent types for washing up the press. In most cases, the same wash can be utilized for both rollers and blankets.

- 1. Water-miscible washes** – the most popular type in the industry, water-miscible (or mixable) washes can generally be blended with 20%-50% water. Featuring moderate drying speeds, these washes remove ink and water-soluble glazes, such as gum and paper fillers in one wash-up. Water-miscible washes are available in detergent, low-VOC, vegetable oil and non-photo-chemically reactive formulas.
- 2. Straight solvent washes** – an economical alternative to water-miscible washes. They cannot be mixed with water and are, therefore, used directly from the container. This type of wash features fast drying and good penetration of dried ink.
- 3. Two-step washes** – applied in a sequence, these washes are used for deep cleaning and color changes. The two-step process has been designed to cut wash up time in half when changing from dark to light colors in the same unit. Step one is a blend of detergents, solvents and water in a heavy-viscosity wash. Step one solvents quickly “bite” into the ink and remain on the rollers, while the detergents penetrate into the roller surface and carry the ink and glaze residue down to the wash-up blade for removal. The drying time for step one solvents is slow. Step two is a water-miscible rinse wash that is used to completely remove all of the step one wash and to prepare the roller surface for the next color.
- 4. Environmental washes** – were designed to meet increased demands created by recent environmental legislation. They use a broad base of ingredients, most of which are designed to lower VOCs, raise flash points, and reduce environmental and health concerns in the press-room.

The Ink Roller Train

The ink roller train consists of an ink fountain with ink keys, an ink distribution blade and roller, a ductor roller and alternating hard and soft distribution rollers. Proper ink distribution begins at the ink fountain. If the blade is nicked, the roller surface scored or pitted, or the fountain ends clogged, the ink distribution will be inconsistent and uncontrollable. The ink keys must be routinely cleaned to keep these parts moving smoothly.

The metered ink from the ink fountain passes between the alternating hard and soft rollers. This ink film is milled, split and delivered all the way to the form rollers, then to the printing plate. If the press is to print with the expected quality, the soft rubber rollers must maintain their correct shape and durometer (or softness).

- Proper roller durometer is critical to the performance of the ink roller train. Hard rollers require more pressure to attain the proper “stripe” or contact with the next roller surface.
- When more roller pressure is required to get the proper “stripe,” friction and heat will build up and further damage the roller’s ability to split and deliver the ink film.
- Hard rollers transfer less ink than soft rollers, and ink feed must be increased to achieve proper density. Increased ink feed results in increased water feed.
- Changes in the shape of a roller cause the “stripe” to become uneven and the ink will not transfer evenly across the press. This shows up on the printed sheet as an inability to achieve proper ink density from side to side.
- Rollers change shape as they age. Swelling on the ends of the roller usually indicates that the center of the roller has collapsed due to the leaching of plasticisers. Plasticisers are an ingredient in the rubber compound that gives the roller its softness and shape. Exposing rollers to harsh solvents and deglazers depletes the amount of plasticisers in the rubber and the rollers can harden or collapse.

There are some mechanical problems that can contribute to ink control difficulties such as the existing condition of the rollers, roller settings, bearings and the correct lubrication of the press. However, the biggest culprit is glaze.

Glaze

Glaze is a condition when the roller surface becomes contaminated with dried chemical and solid debris. This condition hardens rollers prematurely and creates a surface that will not carry and transfer ink properly.

Glaze can also create a surface on the roller that attracts water and displaces ink, otherwise known as “roller stripping” (the inability to carry ink in a particular area). There can also be color variation problems

Roller and Blanket Maintenance — continued

caused by ink density changes during the run without any changes in the ink and water balance settings. Glaze will also contribute to color contamination problems when old ink debris discolors the ink in use.

Causes of Glaze

The elements that contribute to glazing have evolved over the years. Today's printers are using alcohol substitutes, new ink formulas, low VOC products and alkaline papers. All these factors can increase glaze problems. Today, glaze can be divided into three categories: solvent soluble, water soluble and acid soluble.

- **Solvent soluble glaze** – contains mostly oil-based ingredients, including ink particle pigments, oils, resins, varnishes, binders, dryers and some oil-soluble ingredients from fountain solution of alcohol replacement components. Solvent washes will dissolve these by-products.
- **Water soluble glaze** – contains gum arabic, fountain solution debris, dried alcohol replacements, spray powders, paper coatings, paper lint, some minerals, and some surfactants. The regular use of water in the wash up process, along with regular use of a detergent-type deglazer, will remove this type of glaze.
- **Acid soluble glaze** – is most often caused by calcium from inks or calcium carbonate, an ingredient in alkaline papers. Calcium combines with carbon dioxide and forms calcium carbonate. Calcium carbonate is not dissolved by water or solvents, and must be removed with a product specifically designed to eliminate calcium. When not removed, the build up of calcium carbonate will contribute to roller durometer increase, roller stripping, plate blinding and color variation.

Recommended Roller and Blanket Maintenance Procedure

Roller:

- Perform regular wash up during a press run as needed
- Perform a color change wash-up when printing radical changes in color (such as dark to light), to prepare for varnish or to remove metallic pigments
- Perform a maintenance wash-up twice weekly to ensure high productivity from the press

Blanket:

- Perform regular wash up during a press run as needed
- Perform a maintenance wash-up twice weekly

The following information serves as a printer's guide to understanding the U.S. EPA Control Technique Guidelines (CTG) and the Alternative Control Techniques (ACT) as used to measure volatile organic compounds (VOC) in the pressroom.

VOC

A VOC is a Volatile Organic Compound, also known as VOM - Volatile Organic Material, or VOS - Volatile Organic Substance.

Volatile Organic Compounds are solvents derived from petroleum or other sources, which evaporate into the atmosphere. When exposed to sunlight, VOC can react with emissions from vehicles to cause air pollution problems. VOC emissions are measured in pounds per gallon, grams per liter or percentage by weight. The test method approved for VOC measurement of pressroom chemicals in the United States is EPA Test Method 24.

Test Method 24 is used to measure the VOC in a liquid and proceeds as follows:

- One-half gram (a few drops) of the liquid is weighed into an open cup and placed in an oven heated to 110°C (230°F) for one hour.
- The cup of liquid is removed, cooled and weighed again. Whatever has evaporated by weight is considered to be volatile and that weight is called the VOC content.
- If the liquid to be measured contains water or chlorinated solvents, additional tests and measurements are performed to establish VOC content.
- Water is not a VOC and chlorinated solvents are exempted.

Control Technique Guidelines

Control Technique Guidelines (CTG) are a series of industry standards that the U.S. EPA would require each state to adopt to help lower VOC emissions. The first draft CTG standard proposed for the lithographic industry suggested that all blanket and roller washes contain no more than 30% VOC. Most press washes, including water miscible washes and the popular quick-drying solvent washes, contain close to 100% VOC. Forcing all printers to use washes containing less than 30% VOC was a drastic change.

The technology to produce washes that cleaned effectively with less than 30% VOC content did not completely exist at that time. This became evident when the U.S. EPA sought comment from printing industry organizations like GATE, PIA and manufacturers like Varn. The EPA learned that 30% VOC washes were ineffective, reduced productivity and actually created pressroom safety hazards by their inherent slippery and greasy nature.

As a result of their findings, the EPA published a supplementary document to be used in conjunction with the original draft CTG when determining methods for reducing VOC emissions in the pressroom. This supplementary document is the Alternative Control Technique (ACT).

VOC and Vapor Pressure — continued

The ACT guidelines, published in September of 1994, permit individual states to use vapor pressure measurements of press washes as an alternative to reduce VOC emissions. Vapor pressure measures the volatility of a product or its ability to evaporate. As an example of the effect of vapor pressure, consider a lawn mower's gas container and how it expands in hot weather. When opened, the fumes vent from its cap. Volatile Organic Compounds also have a tendency to expand and try to evaporate. As temperatures rise, vapor pressure also rises.

Measuring Vapor Pressure

A glass measuring device, similar to a barometer, is used to measure the vapor pressure of a Volatile Organic Compound. The evaporation of a VOC in this closed device pushes a thin column of mercury up a glass tube. The vapor pressure is measured as the height of the mercury in millimeters. The EPA vapor pressure rule states that any blanket or roller wash which measures less than 10 mm of mercury (Hg) at 20°C (about room temperature) can be considered a low VOC product, equivalent to a product with less than 30% VOC content as measured by Test Method 24.

Fountain Solutions, Alcohol and Alcohol Substitutes

Both the Control Technique Guidelines (CTG) and the Alternative Control Techniques (ACT) cover VOC measurement in fountain solutions, isopropyl alcohol and alcohol substitutes. The vapor pressure alternative does not apply to fountain solutions.

How This Affects Printers

In the U.S., each state is free to use either the CTG or ACT guidelines or a combination of both. Since these choices are subject to change by state legislative action, individuals are encouraged to contact the environmental enforcement group in their state (these groups may be listed under various names, e.g.; Department of Natural Resources, State's Environmental Protection Agency, Department of Air & Water Quality, etc.). It is recommended to send a letter asking for adoption of the vapor pressure rules on blanket and roller washes, which gives the greatest flexibility in selecting products while helping to reduce air pollution. Use of a 30% VOC wash will be required if your state elects to remain with Test Method 24.

Limits for alcohol and alcohol substitutes in fountain solutions are only slightly different between CTG and ACT versions. The bottom line for printers is that alcohol must either be eliminated or severely limited, depending on which guidelines are used. If more than the prescribed amount of alcohol is still being used, it is strongly suggested, in the interest of economics, to begin eliminating its use at this time.

The Function of Fountain Solution in Offset Printing

The dampening of the offset plate is one of the most critical factors in the production of quality offset printing. Through the use of a fountain concentrate mixed with water, a solution is created that performs several essential functions on press. The most important of these is the wetting and desensitizing of the non-image area of the plate. The fountain solution also lubricates the plate and blanket. This reduces image wear and prolongs plate life. Fountain solution cools the plate, helps to maintain the working properties of the ink and aids in proper blanket release, which in turn, reduces piling on the blanket.

Water Hardness Scale

(in parts per million of calcium carbonate)

Soft	0-100
Medium	101-200
Hard	201 and greater

Water

Approximately 98% of a working fountain solution is water. Tap water can range from very hard to soft. Water quality can vary seasonally, monthly, weekly and even daily. It is critical to be aware of water conditions at all times to insure quality, trouble-free printing. Ideally, printers should use treated water for purity and consistency.

Measuring Fountain Solution Concentration

Establishing the proper pH in the dampening fountain is essential to plate performance and print quality. Maintaining the correct level of acid in the solution is absolutely necessary to permit the gums in the fountain solution to bond to the non-image surface of the plate.

The pH scale is logarithmic to the 10th power and each whole number represents a ten-fold increase or decrease in acid or alkaline concentration.

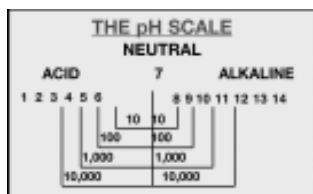
Buffers

Buffers are ingredients that Varn adds to fountain concentrates to help stabilize the pH level of the mixed solution. These buffers reduce the tendency of pH to drift to either the acid or alkaline range due to the introduction of contaminants found in paper coatings, inks and additives.

Buffering is also useful when using one-part alcohol reducing fountain solution concentrates. The stabilized pH level allows for the addition or reduction of concentrate within the working range without concern for pH level. Careful attention should still be paid to mixing concentration. The use of buffers makes it necessary to use conductivity as your measurement.

Conductivity

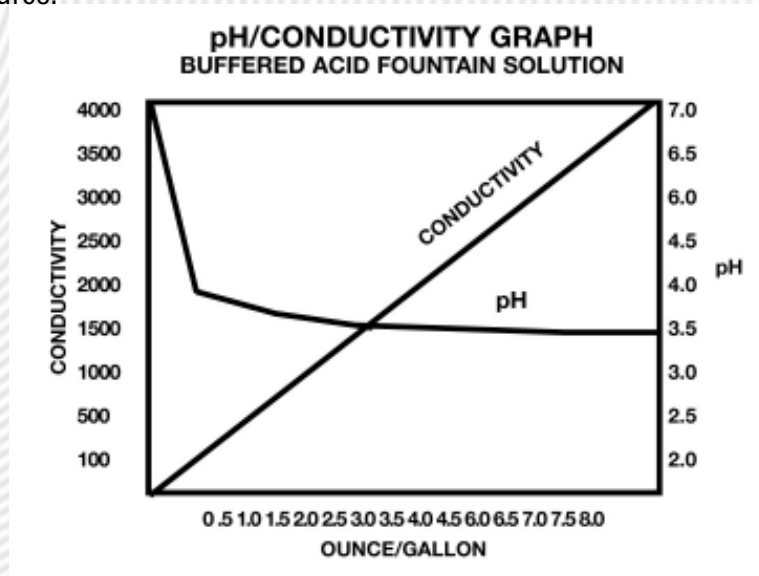
This is the measurement of the ability of a fountain solution to conduct electricity. Checking fountain solution conductivity is particularly impor-



Fountain Solution Chemistry — continued

tant when running a buffered fountain solution that tends to hold a constant pH reading despite great changes in water quality. Conductivity will indicate even the slightest variation in fountain water quality.

There is no universal conductivity standard for all fountain solutions. Individuals must develop a standard for their plant using their water source.



The graph illustrates that pH remains constant from 3.5 ounces per gallon up to 8 ounces per gallon. Thus, monitoring only pH level through the press run would be useless in determining actual fountain concentration or contamination level. Conductivity measurement, however, shows a linear progression of concentration or contamination level.

Alcohol

Alcohol has been identified as a Volatile Organic Compound. As a VOC, alcohol pollutes our pressrooms and our environment. Federal, state and local environmental regulations have taken effect and by now, most printers have tried or are currently using alcohol replacements.

Alcohol Replacement

In order to replace alcohol, there are a few important considerations. Alcohol is a single raw material that, by itself, performs several functions for the pressman. When running with alcohol replacements, the pressman must perform some functions. To be successful, a roller and blanket maintenance program must be implemented (see Chapter 6, Roller and Blanket Maintenance). Reset rollers to the light side of the specification and invest in new rollers if needed. Keep recirculators clean on a regular basis. Invest or maintain chillers and recirculators. Be ready to re-balance the press and turn down the ink feed.

The primary function of anti set-off powders is to form a space between sheets as they leave the press. This separation traps air between the sheets to speed ink drying. It also breaks the suction effect of static and prevents the wet ink from setting off onto the sheet above. The ability of the powder to perform this function is a result of a combination of particle size, density and the number and nature of particles applied. Usually, as the weight of the printing stock increases, the recommended particle size also increases. The largest users of spray powder are folding carton printers and large sheetfed offset printers.

Spray Powder Elements

Varn Anti Set-off Powders are blends of pure food starches with anti-caking and flow agents added. Varn Coated Powders go through an additional manufacturing step that microencapsulates the individual particle to change its performance.

How the Powers are Different

Varn manufactures two types of anti set-off powder:

- The “R” series - regular or uncoated powders
- The “C” series - coated powders

Both are available in a wide range of particle sizes. The coated, or treated powders, are quite different in their working properties from the regular powders, but both types perform well in electrostatic (electronic) units as well as conventional air-pulsating guns.

Varn coated powders are microencapsulated which completely changes the working properties of the powder. They repel water and are attracted to the surface of the ink, giving better ink set-off protection with increased mileage. Coated powders flow and perform better in electronic units than conventional powders and, because they resist humidity, they won't clog air guns. For a given micron size, coated powders offer a smoother finish and are ideal for the last pass-through on large, multi-unit presses.

Micron/micron Range

A micron is a measurement equal to one millionth of a meter (1/25,400 of an inch). Varn powders are listed in micron ranges because most powders contain quantities of smaller and larger particles due to the nature of the raw materials used. Varn controls particle size by careful selection of the proper raw materials and by a unique screening operation during manufacturing.

When to Use Coated and Regular Powders

Coated powders cover the majority of applications. They are ideal for use by large corrugated printers, folding carton manufacturers, most four-color work printed on four-color presses and most large sheet-fed printers running heavy lifts of paper. The grade of coated powder is determined by the weight of paper, the print coverage and the press spray equipment. As a rule, the grade of coated powder, and therefore the micron size, increases as the weight of the paper, print coverage or the height of the delivery pile increases. Coated powders should not be used when sheets are laminated or have certain coatings. Check with the coating manufacturer on whether to use coated or uncoated powders.

Varn's regular powders are used in work-and-turn printing, multiple-color printing on presses with fewer units than the number of colors being printed, or any printing that requires multiple passes through the press. There are some exceptions, but trapping, especially on small presses, improves with regular grade spray powder.

Troubleshooting

There are a variety of pressroom conditions that cause or affect ink set-off. Among them are:

- **Room Temperature** – the higher the room temperature, the faster the ink will dry. Temperatures above 70°F (20°C) speed ink drying.
- **Room Humidity** – relative humidity above 60% retards ink drying. A difference of 10% in humidity can appreciably alter drying time.
- **Stock Humidity** – this condition greatly affects ink set-off. A job that sets off in the center of the sheet and not on the outside edges is often caused by humidity variations in the stock. Stock that does not lie flat is more susceptible to ink set-off.
- **Static Electricity** - static accumulation on the sheet can be a prime cause of ink set-off.
- **Stock Weight** – folding carton stock and other heavy stock has a greater tendency towards ink set-off.
- **Ink Drying** - ink formulation, drier type and content are prime factors in reducing ink set-off.

TROUBLE	CAUSE	CURE
Overall ink set-off	<p>Not enough powder applied or too fine a micron size</p> <p>Too much ink applied or incorrect ink/water ratio</p> <p>Pile is too high</p>	<p>Increase amount of powder and/or increase micron size</p> <p>Cut back ink, check fountain pH Add Compound 747 (ink conditioner)</p> <p>Set out job in smaller lifts</p>
Ink set-off only in specific areas of the sheet	<p>Spray pattern is uneven</p> <p>Powder does not cover the full sheet</p> <p>The powder splashes or lumps</p>	<p>Check for blocked nozzles</p> <p>Check timing of powder unit</p> <p>Foreign matter in powder or spray unit out of adjustment</p>
Powder builds up on the blanket or spray nozzles	Too much powder applied or incorrect micron size	Cut powder volume or increase micron size
Powder clogs in applicator spray bar or on nozzles	<p>Powder is damp</p> <p>Poorly graded powder</p> <p>Air supply is inconsistent</p>	<p>Clean dispensing unit and refill</p> <p>Change to Varn powders for quality and performance</p> <p>Clean unit and air lines or have unit serviced</p>
Powder interferes with overprinting, laminating or is blocking the plate	Particle size too large or wrong grade used	Refer to application chart and select uncoated (regular) grade and size. Regular grade powders will perform better in overprinting, varnishing or laminating
Rough finish on printed sheet	Micron size is too large	Decrease micron size
Powder flying or dusting	Excessive amount of powder or too much	Reduce powder volume or micron size and/or reduce air supply



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