

## **NEWSPAPER FLEXO: A NEW APPROACH**

**Bruce A. Smith**

At The Ink Company, we are excited and enthusiastic about this new method of printing newspapers with water base inks. We envision nothing but success on the horizon for everyone involved.

While there are drawbacks to Flexo, we are convinced that the benefits outweigh the negatives by far. As a result, we are totally committed to the development of the best ink systems possible for this innovative process.

To clarify what we mean by "A New Approach", it must be understood that our concepts were contrary to those of other ink manufacturers a year ago. Therefore, I believe it is relevant to explain our original concepts because we still believe in those concepts, and we base all of our formulation procedures on them.

We began by addressing the following conditions:

The inks had to be very strong in order to run at the lowest viscosity possible. This would help prevent plate plugging and would make the inks more cost effective to the printer.

The inks had to be highly resolvable to prevent anilox plugging.

They should dry fast enough to allow press speeds of at least 50,000 impressions per hour or more.

They should remain open as long as possible on the anilox and plate while drying fast enough on the sheet to avoid second impression offset.

They should be stable, non-settling, and pH controlled.

Finally, we felt that the ingredients in the inks should not have any harmful affects on the plates, anilox, or press equipment.

In addition to supplying inks, we thought the ink manufacturer should be responsible to provide the following items and services to the printer.

First, a water-based cleaner should be available which could be employed during the wash up cycle and not harm equipment or plates or have adverse affects to the inks if they were mixed. Secondly, we offered viscosity charts to the printer to reduce our inks to the desired viscosity in order to prevent over additions of water.

We then offered to help customers set up quality control checks and lab tests to ensure consistency in the inks they purchase. In this way, the

printer can predict the chances of an ink trial's success by comparing it to an ink which has run successfully in the past. By performing these tests first he not only saves money, but a considerable amount of wash up time. We also extended a helping hand in arranging seminars to pressmen to give them a better understanding of water-based inks and how to handle and control them.

And finally, we felt that an extender for the inks should be available to commercial printers. Since commercial printers often require different densities for various types of work, four color process as opposed to Sunday comics for instance, we believed that the printer may wish to fulfill his own density and control his ink costs by extending his ink rather than purchasing various sets of inks.

While some inks may be reduced with water to achieve the same end, other inks may be too strong for comics even at extremely low viscosities. Therefore, we felt that an extender might prove to be a useful tool to the customer.

Let me state, however, that an extender is merely a tool and not a requirement. As ink makers it is our responsibility to offer as much information to the printer as possible.

For the remainder of this presentation I will confine my remarks to a list of suggestions, possible improvements, and some food for thought in the hope that they will be constructive and useful to you as a printer.

---

## **PURCHASE OF INKS**

Try to determine some of the qualities you are looking for. Strength, resolubility, drying times, for instance, are all measurable. This can prevent costly delays at press side resulting from changes in these areas.

---

## **INK MILEAGE**

There are many factors which influence mileage and cost, some of which are:

- stock
- specific gravity of inks
- ink viscosity
- impression settings
- cell depth of anilox roller

**Stock:** This is the first consideration because it is the key to absorption. An example would be greater ink consumption on paper than on a polyethylene bread bag. Another example would be the difference between calendered paper and non-calendered. A calendered stock would absorb less ink, hence the mileage would be greater.

**Specific Gravity of Inks:** Generally speaking, higher gravity inks give less mileage. We believe this to be due to the heavier pigments being more difficult to transfer from the cells to the substrate. Normally these colors include yellows, oranges and whites. Conversely, we would expect to see

better mileage from reds, blues and black. This is, of course, dependent upon all things being equal.

At this point, I should explain how we determine specific gravity. This is done by comparing the weight of a given volume of material to the weight of a given volume of water. In numerical terms water has a specific gravity of "one" while an ink may have a specific gravity of 1.4. That is, the ink weighs 1.4 times as much as the water.

Ink Viscosity: Two things must be considered with this variable:

1. Viscosity of inks received  
It is evident that an ink which can be reduced considerably with water will yield better mileage than an ink which allows less reduction.
2. Running viscosity  
An ink that can be reduced to a lower than normal viscosity, such as an ink that runs at 7-8 seconds as opposed to an ink which must run at 10 seconds to achieve equal density, will increase your mileage even further.

We believe that by running these lower viscosities the printer can benefit in several ways.

1. Less plugging
2. Faster press speeds
3. Faster drying
4. Eliminates second impression set-off
5. Better mileage and economics
6. Less pulling of paper fibres since tack is reduced and allows more room for the re-use of wash water.

In the beginning we were convinced that we should offer inks at press-ready viscosities to prevent over-additions of water. As I am sure you know, there is a point at which you are no longer reducing viscosity by adding more water. The viscosity of water is around 5 seconds on a #3 shell cup. The closer you get to 5 seconds the closer you are to running colored water. By reaching this point you are cutting the resin's ability to transfer the pigment, changing the pH, and increasing foaming.

We have no problem with supplying inks without the reducing water, however, we do suggest that proper viscosity controls be maintained. Here are some suggestions to help you accomplish this.

1. Request viscosity charts from your ink suppliers. Each supplier's ink will vary and it is difficult at best for your pressmen to remember the differences.
2. Consider automatic viscosimeter systems. This eliminates human error and frees the pressman for other duties.
3. Keep graymills, holding tanks, drums, etc., enclosed during running. This will help prevent the viscosity from rising, which will in turn help to prevent plugging, set-off, and drastic density changes.

In addition to this we suggest that, if you are adding water by filling pails, that the pails be clean. If they are the same pails being used to add ink, often they have become contaminated with dried ink and you will actually increase plugging problems. Some of the dried ink will be caught in the filters which makes it necessary to clean them more often and results in an additional expense in man hours. Other particles, which are very small, will pass through the filters and plug the anilox or the plate or both.

When mileage is being calculated we suggest that only the initial add of water be considered and not the water that is added during the run. Water will evaporate during running and must be replaced. This is not mileage.

From an ink company's point of view it would be nice to take credit for that, but it would not be true and is unfair to the printer. If you can fill your fountain with two-thirds ink and add one-third water to reach the desired viscosity for a trouble-free press run, that is your mileage.

Water inks, by nature, dry quickly. It is best not to allow the viscosity to get too high. While they may print denser and appear stronger, they will also dry on the cylinder edges and build up on the doctor blade which will cause chunking and plug the return lines.

Density: As I said a moment ago, higher density can be achieved by raising viscosity. We believe it is better to use a strong ink at low viscosity. While you raise density by raising viscosity, you also increase problems with plugging, set-off and chunking.

By running strong inks at low viscosities you not only decrease these problems, but you are able to run at higher speeds. Also, water should not be used to reduce density. Instead, we suggest that you should control density with the use of an extender. An extender not only changes the density, it actually helps transfer, sheen and resolubility which in turn reduces plugging. An extender also improves economics since it increases mileage by adding a lower cost material to the ink.

We have found that as much as 40 percent extender can be added while maintaining densities above 1.0. We have also found it to be an excellent press-side aid to the printer and to us in solving runability problems during a run.

pH: It is our belief that pH is not a difficult factor to control. We feel that pH is the ink maker's responsibility and not a major concern to the printer. The only time a printer should be concerned with pH is when he does something to alter it, which in most cases is not happening.

In our opinion pH is important only as it pertains to the formulation of inks. pH is that magic number which determines the shelf life of the ink and whether or not the pigment will settle out in the drum or shipping container. Generally, pH is affected only when inks are improperly handled. For instance:

Inks should not be pumped or dipped from drums using ordinary metal pumps or pails. The most commonly used containers are plastic or stainless steel that will not affect pH.

Since pH is controlled by using amines such as ammonia, it is important that containers be kept closed, including graysmills or containers used to feed fountains simply because ammonia and other amines will evaporate. When this happens, the pH is lowered and will cause the chunking and settling problems I mentioned earlier.

This phenomenon very often leads to the misconception that pH affects drying. The fact is that the loss of amines causes a kick-out of resin and pigment giving the impression that the ink is drying faster. Actually, the resin and pigment are no longer water soluble. This is desirable on the final printed sheet but not in the fountain.

**Stability:** This goes hand in hand with pH. If the ink maker has done his job and the printer does nothing to alter the condition of the ink, stability is increased tremendously.

Stability and pH can also be affected by temperature. This is why we recommend that reasonable care be taken to store inks where they will be "comfortable". In other words, if you are comfortable, not too hot or too cold, the inks will be too. The idea is to keep the inks around room temperature. However, they normally tolerate cooler or warmer than usual days.

Resolubility and drying are closely related and are probably the most important relationship in the ink. We have actually seen initial plugging clean itself up as the press began to run. The ink's ability to re-wet itself is extremely important in keeping the anilox cells open and able to receive fresh ink. It also affects the plate surface in the same way.

In striving to design inks which dry fast enough to run the press at top speed we found that we dried too fast on the plate. This fast drying prevented, to some degree, the ink's ability to resolubilize and caused plugging. We have since learned how to slow the drying slightly without sacrificing higher speeds. We also found that by doing this we were able to increase resolubility.

Lastly, concerning mileage, we suggest that you endeavor to purchase inks that do not settle. Not only will you lose poundage that has settled but you may even plug more often on the anilox and plate.

**Impression settings:** Strive for a kiss impression; this will give you better and less plate wear.

**Anilox roller:** Obviously, the larger or deeper the cells, the less mileage. A 450 line screen will yield better mileage than a 375 line. A 375 line will be some what better than a 360, and so on.

**Press speed:** Press speed has little affect on mileage. However, faster press speeds appear to transfer the inks better and the print appears denser.

In this sense there may be a slight decrease in mileage, however, by transferring better you can run inks at slightly lower viscosities, thereby offsetting this decrease. In other words, we believe that you will come out even on mileage and achieve a denser reproduction at higher press speeds not to mention better production, resolubility and less plugging.

---

## **BULK HANDLING**

In choosing a bulk handling system, we suggest the use of diaphragm pumps. We also suggest that prop agitators be avoided. This will help to prevent foaming problems.

We recommend paddle type mixers designed to stir the inks rather than agitate them. If you do incur a settling problem, violent agitation will only cause further problems. We have a mixer design of our own which is available to anyone who may be interested.

No matter which system you choose we feel that the following should be a part of it.

Keep air away from the kits as much as possible by closing lids and by keeping ink lines full.

Keep inks clean with proper filtration to and from the press.

Automate as much as possible, particularly where viscosity is concerned.

---

## **CHOOSING PAPER**

Much research has been done in this area and there are now several excellent papers on the market at competitive prices.

There are studies going on which may prove that a paper with a pH of 6 may run better with water-base inks than a paper with a pH of 3 to 4.

---

## **ANILOXES**

We suggest that proper care and handling of anilox rolls be accomplished in several ways. In addition to your supplier's recommendations, we suggest the following.

To reduce anilox wear, back the doctor blade off and reset at least once a week.

Have your inks tested by anilox experts to insure against ingredients in the inks which may be corrosive to anilox surfaces.

Also check with anilox experts and plate makers concerning the cleaners you are using. Again, this could have an adverse affect and may even add to excessive wear on both plates and aniloxes.

---

## **RUNNING VISCOSITIES**

As I mentioned earlier, low viscosities run the best. We recommend that you run no lower than 6 seconds and no higher than 10 seconds on a #3 shell cup to achieve the best results.

---

## **TACK**

An area of possible significance, which up until now may not have been

given enough attention, is the tack of water-base inks. These inks, like any other, do have a tack.

Since lower viscosity inks have less tack, it may prove useful to run the first down color in process printing at a lower viscosity. By doing this, you may not pick as much and reduce the amount of paper fibres which transfer from the stock to the plate, which as you know, aggravates plate plugging difficulties.

---

## **RE-USE OF WASH WATER**

The re-use of wash water does not, in our view, present a major problem as long as the following conditions are met:

1. Care must be taken to control the pH from dropping too low which would, of course, affect the pH of the ink.
2. As noted earlier, cleaners used with wash water must not be harmful to the inks.
3. The wash water must be filtered to remove contamination.
4. Bulk storage of inks must be large enough to absorb the amount of wash water being generated.

If this is not possible then a wash water tank would be necessary and the water would have to be treated to control pH.

Since black absorbs all other colors, we would recommend using wash water with a high viscosity black. By doing this, it would not be necessary to filter color out of the water. You would only be concerned with filtering large particles such as paper fibre or dried ink.

---

## **SEMINARS**

Last, but not least, we would like to offer our assistance toward instructing and educating your people in the use of water inks. It has been our experience that many of the pressmen are people who have been running oil presses for many years. We think it would be advantageous to you as a printer and would promote a greater interest on the part of the press operators if the ink suppliers were allowed to conduct seminars. Much of the information we have discussed in the article would be very beneficial to your pressmen. We feel that if we can help them do a better job, we as ink makers will be able to do a better job. They, in turn, can teach us a lot about the problems they are facing everyday concerning all of the things we have talked about.

Water based inks are the wave of the future. Water flexo is slowly taking over much of the printing previously done with solvent and oil based inks. I fully expect to see it replacing heatset inks in the near future, as I also expect to see it take over the entire news field someday.

Water inks are better for workers, better for our environment, better for future generations, and better for our nation and the world. They are not nearly as complicated as some people believe they are. They are just a different ballgame with different rules.