

THE SECRETS OF A GOOD IMPRESSION

It begins with a minimum of ink, a minimum of water and a fountain solution with the right surface tension.

Lithography is really a very simple process. With great precision and at high speed, water and ink are metered to the plate simultaneously. They mix with each other in a meticulously-controlled way on the form rollers and are deposited separately, each to its own designated area on the plate.

Experienced press people know that the lithographic process relies on the equilibrium of the ink-water mixture. One of the most difficult variables to control is the ever-changing relationship between ink and water on the plate surface. To ensure minimal use of ink and water and to achieve the best possible ink-water balance during a press run, a fountain solution with a surface tension between 32 and 45 dynes/cm, according to the type of press used, is essential.

Besides the minimum ink-water balance, there's a second important factor that contributes to the success of a good impression – the cleanliness of the non-image area of the plate.

A fountain solution containing a natural Arabic gum (14°Be) ensures a continuous formation of a protective film that desensitizes the plate's non-image. Maintaining precise control over the protective film will ensure minimal use of water and result in an optimal ink-water balance.

A good fountain solution is crucial

Experienced press professionals understand this. They realize that a fountain solution's surface tension always affects the printing process since it acts directly on the quality of the water that's transported as well as the ink-water mixture. It facilitates the formation of a thin, uniform and reproduceable water film before each application of ink. These two key requirements (fast plate wetting and the ability to form a thin water film) are critical for lithographic dampening systems. And they are largely determined by the surface tension of the fountain solution.

Pure water has a surface tension of 72 dynes/cm. In dampening solutions containing an alcohol concentration of 10% – 25%, the surface tension will be reduced to 35 – 45 dynes/cm. This enables the solution to spread over the plate rapidly in a thin, continuous film.

In general, a fountain solution will consist of water, acid and gum (see above), corrosion inhibitors to prevent the solution from reacting with the plate, fungicide, anti-foaming agent to prevent build-up. Last but not least, we find wetting agents such as isopropanol or alcohol substitutes, which decrease the surface tension of water and water-based solutions.

When alcohol or these substitutes are mixed with a fountain solution on a press using a dampening system employing

alcohol, the surface tension is reduced. The result: alcohol or its substitutes help the water to wet the dampener form roller evenly, requiring less dampening solution.

A thinner film of solution will help keep the non-image area of the plate clean. It will also help to spread water properly over the ink on the rubber bareback form rollers that apply both the ink train – therefore less dampening solution is applied to the paper. Thinner film also aids in preventing water spotting because the fountain has finer drops dispersed in the ink. It also suppresses foaming.

The importance of alcohol and substitutes

The addition of alcohol in the fountain solution increases the viscosity of the water, which in turn allows a thicker layer of dampening solution to be applied to the ink and non-image area and improves the performance of the ink, paper and printing plates.

When using substitutes, the fountain solution is metered by the squeezed rolls used in the majority of continuous contact-type dampeners. The immediate effect is that the dampener speed must be turned up, which leads many press operators to conclude, erroneously, that they must use more water to print with a substitute.

To partially offset the loss in the viscosity produced by eliminating alcohol, the dampening solution can be cooled to 50 – 55°F. Substitutes differ from alcohol in several key properties – how they affect viscosity, surface tension, pH and conductivity.

In alcohol-free dampening solutions, surface tension is reduced by additives called surfactants. These are organic chemicals that concentrate at interfaces because of their polar molecular structures. They travel to the interfaces between the dampening solutions, and both air and the ink on the image areas of the plate. At higher press speeds, interfaces are used and reformed rapidly. Surfactants may diffuse rapidly to replenish new interfaces. An excess of surfactants can contribute to excessive ink emulsification.

Alcohol substitutes also offer an excellent opportunity to dramatically cut the amount of VOC emissions from a press. Because alcohol substitutes do not have a diluting effect on ink when used in proper concentrations, less ink and water are needed for good colour reproduction. Sharper dots are produced and there is less of a tendency for dot gain.

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