

ECS setting the standards in pressroom solutions

Fountain Solution Guide

The use of fountain solutions in lithography has a vital role, helping to control the flow of ink over a printing plate, whilst protecting the plate at shut down and cleaning it of ink and paper debris. Its ultimate role is to help control the ink-water balance within the printing system. The method by which this is all achieved is to use a fountain solution, a single fluid that accomplishes a variety of functions, using several chemicals mixed into a single solution. This is dosed at a pre-determined concentration into the dampening system on press and can be accompanied with alcohol to help control surface tension, or can be used alone.

Functions of fountain solution

Fountain solutions have 7 key roles:

- 1) **Keep ink from the background of the plate** – without a film of water to keep the background of the plate ink-free, the ink will flow onto the background, and cause what is known as scumming. The water prevents the ink from bonding to the aluminium plate, and therefore printing an incorrect image.
- 2) **Maintain the hydrophilic nature of the plate background, to desensitise the plate** – the printing plate has two areas with different natures, the image which is lipophilic (or hydrophobic), and therefore will accept oil based inks, and the background which is hydrophilic (or lipophobic), which will accept the fountain solution/water which will prevent the ink from bonding to the background.
- 3) **Quickly clean ink from the background of the plate** – at start up, the plates may have an amount of ink on them. The fountain solution needs to be able to clear the plate of the ink. It utilises the capillary action of the plate, as well as salts on the plate that enable the water to flow across the plate easier.
- 4) **To increase the wettability of the water (that is the speed with which the water can flow across the plate)** – this is achieved by lowering the surface tension of the water, meaning it can flow more easily across the plate. This reduces the time taken to wet the plate, allowing for faster start up and decreasing the plates sensitivity to ink. Alcohol is often added on most presses to help further alter the surface tension.
- 5) **To enable the water to flow evenly through the dampening rollers** – a low viscosity fountain solution will flow through the rollers, but because of the low viscosity, the water may not come through smoothly, or evenly. By increasing the viscosity, the water can flow through the rollers more evenly.
- 6) **Lubricate the printing system** – the water on the plate reduces the amount of friction the plate will experience, and helps remove the build up of paper lint and ink build up. This prolongs the life of the plate, and allows for cleaner printing.
- 7) **Control the emulsification of the ink and water** – modern inks require a certain amount of water content in order to print smoothly. The fountain solution, being mainly water, will mix with the ink to a certain degree. Emulsifiers control the amount of water mixing into the ink, and help create a smooth emulsion.

Choosing the right fountain solution

It is highly important to evaluate the type of press being used. Query the dosage being used of current product and whether alcohol is being used and if so how much is being dosed. Also insist on the printer carrying out a full system flush prior to trialling any new product as contaminants that may have built up in the system during use of the existing products, can manifest themselves through changing to a new product depending on the nature of it.

Most fountain solutions are highly buffered to maintain a stable pH and conductivity, and because one product has different readings for these variables does not make it the wrong product to use (although as you will see in the Problem Solving section below changes in these can affect print performance in some cases).

These variables are more appropriately used to monitor the level of contamination within the system. Sharp changes in either of these can often suggest the system has become contaminated and may need re-flushing. Obviously most printers like to work with certain pH and conductivities as they are used to the values so can monitor these in the system with more confidence and familiarity.

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Problem Solving

The following section lists various issues and offers advice on how to overcome them or avoid them happening initially. Many apparent fount solution issues can be related to ink and paper stocks, therefore, this guide includes some information on these areas also.

Scumming

This is where non imaged areas of the plate pick up ink, which can then subsequently be transferred to inappropriate areas of the printwork.

This is caused by the following:

- *Insufficient amount of fount solution has been used, meaning the plate is not adequately wet with a film of water* – To overcome increase dosage or control speed to rectify this.
- *Dirty Dampening rollers* – Clean Dampeners with a suitable chemical solution – usually a fast drying non water miscible solvent.
- *Dampener-form to plate pressure set too low* – Readjust pressure to suit.
- *Oxidation of the plate occurring* – Clean the plate with a suitable plate cleaner and gum the plate accordingly to prevent this re-occurring.

Emulsification of ink and water

Ink is required to take on a small amount of water to work correctly, however, the water film that is always covering the ink on the rollers must have somewhere to be displaced. Part of the water passes into the ink, improving the flow and transfer of the ink. The thing to consider is how much water and whereabouts it is placed within the ink.

- *Ink emulsifies* – this is caused when the water droplets within the ink become too highly concentrated (the ink over-emulsifies), which can lead to an orange peel effect. When ink is squeezed at the printing nips, these large water droplets release from the ink and show up as imperfections in the image.
- *Too little water* - If there is not enough water or the water is not distributed effectively, there will be problems with scumming or filling in of reverses. The water from the ink acts by desensitizing the reverses or trailing edges of solids. Imagine the water being compressed into the ink during the form roller squeeze and then popping back out after the image has passed the form roller. The fount solution should help maintain a steady balance of picking up enough but not too much water.

Tinting

This is where a uniform, light coloured tint or haze exhibits itself over the entire printed sheet and is caused by the following:

- *Dirty Dampening rollers* – clean well with recommended chemistry before restarting.
- *Fount solution too acidic* – check ph and correct as necessary, whether by de-contaminating the system and using fresh fount, or switching to alternative solution.
- *Ink broken down in the perfectly functioning fount* – consult ink manufacturer for cause and look at replacement ink.

Piling

This is a term that describes the build up of ink and paper lint on the blanket (most commonly seen on the non-image area of the blanket and worse on the trailing edge of solids), and is caused by the following:

- *The ink is too tacky* – Use alternative ink or modify inks' tack using additives. May also be possible to reduce ink film weight to lower tack.
- *Insufficient water being carried on the plate/blanket. Running too dry will increase piling rate* – Increase water dosage, or improve wetting of water using alcohol or substitute.
- *Inks drying too fast can dry out and pile rapidly* – Look to advice from ink manufacturer for slower drying alternative.
- *The type of plate used can also affect piling* – try using smoother grain plates as these are less susceptible to piling.
- *Loose fibres in the paper surface may be pulled off and accumulate within the ink* – look for advice from paper supplier for higher quality grade potentially.

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Picking

This term is often used to describe when “hickies” appear in the image areas of the plate. Hickies are the effect that occurs when a spec of dust or debris (frequently dried ink), adheres to the plate creating a spot shaped imperfection in the artwork.

- *When ink is too tacky it can pull off paper fibres into the ink* – consider additives to reduce tack of ink or switch to alternative ink.
- *The paper stock is either of poor quality and/or has lint on the surface* – switch to a higher quality paper. Some printers run a dummy blanket initially to try to remove paper fibres.
- *Poorly lubricating water/fount solution* – The ink/water cushion provides slip to the mechanics of the rollers reducing the friction which in turn inhibits roller wear, as well as reducing tack. Trial and test dosage and type of fount to give best effects. Clean rollers well in between runs to avoid contamination.

Set-Off

This is where ink is transferred one from sheet to another when in the stack post-printing. This is an unwanted result usually associated with the ink drying slowly or not being protected sufficiently by overprint varnish.

- *Printing with too high a film weight of ink can lead to this* – consider lowering ink film weight. To get the same colour affect may require using a denser ink at lower film weight. It is also possible to overcome by increasing film weight of coating applied to protect the ink.
- *Ink dries too slowly* – consider switching to a faster setting version of the ink, or add driers to the ink to modify suitably. Request help from ink supplier. Fount solution with drier additives may also be incorporated to help speed up the ink.
- *Using coated papers. Because these do not absorb ink readily when compared to more porous stocks, the result is the ink dries by oxidation and takes longer to do so* – use anti set-off spray or faster setting inks, as well as consider drier additives to the ink.

Spraying

This term describes when ink flies off the rollers at high speeds, effectively spraying over the surrounding equipment.

- *When the Viscosity of the ink is too low, this will typically show as **dots** of ink* – Switch to a higher viscosity ink or add rheology modifier to ink (consult ink manufacturer).
- *Conversely if the viscosity of the ink is too high, then usually **lines** of ink will appear on the equipment* – To overcome either add a reducing agent to the ink, or switch to a lower viscosity ink.
- *This can also occur is using too much ink* – in which case reduce the film weight (dosage), of ink.
- *Ink rollers are incorrectly set or have become damaged through use* – check condition of rollers ensuring they have been thoroughly cleaned with a suitable chemical solution.

NB. If in doubt please do not hesitate to contact a member of our technical team for further assistance.

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