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OBSERVING VARIOUS ASPECTS OF ECO FRIENDLY DAMPENING SOLUTION (UNITROL)

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ABSTRACT
The dampening system on a lithographic sheet fed press applies a water-based dampening or fountain solution to the printing plate before it is inked. Dampening solutions keep the non-image areas of a plate moistened so that they will not accept ink, and are applied to the entire plate.The non-image areas of the plate, which are made that way by adsorbing a thin film of gum Arabic to them during plate making, are hydrophilic (water loving) while the image areas are hydrophobic (water repellent). The desensitizing film on the non-image areas wears off gradually as the plate continues to run on press, so the chemicals in the dampening solution replenish the desensitizing film. Ink, plate, press speed, paper, temperature, and relative humidity are the principal factors that influence the need for various dampening solutions.

I. INTRODUCTION
Fountain solution is a water-based mixture specially formulated to dampen lithographic printing plates before they are contacted by the inking rollers. In concentrated form, it is commonly referred to as fountain concentrate, fountain etch, or just etch. Most fountain concentrates today contain synthetic desensitizers. Very few manufacturers still use natural Sudanese gum Arabic because of its cost. The term dampening solution is used for the diluted etch.

II. FOUNTAIN SOLUTION INGREDIENTS
Fountain solutions are usually sold as concentrated solutions that are diluted with water to the proper concentration. Most one-step concentrates already contain a natural or synthetic gum, an alcohol substitute, and other essential ingredients, and simply require being diluted with water. With two-step concentrates, the first step generally contains all of the ingredients except the alcohol substitute, with the alcohol substitute added as part of the second step. Although this extra step might be an inconvenience, it permits the press operator to control the alcohol substitute concentration better.The proper mixture of chemicals in the solution is critical for quality printing. Though there may be many chemicals that make up a given manufacturer's dampening solution concentrate, the general ingredients common to most are described below.

Composition of a Fountain solution
Fountain solution composition varies for a number of reasons. Most dampening solutions, however, are acidic, with a pH of 4.0-5.5 being typical. The dampening system itself also influences the composition of the dampening solution. For example, some dampening systems require a specific percentage of alcohol (or alcohol substitute) due to the method of applying the solution to the printing plate. Sometimes, in a conventional dampening system, the use of such an additive improves print quality although its presence in the dampening solution may not be essential.
In general, a dampening solution will consist of the following ingredients:

- Water, with minimal impurities.
- Acids or bases, depending to a large extent on the ink being used. Acids used include phosphoric acid, citric acid, and lactic acid.

- Gum, either natural (gum Arabic) or synthetic, to desensitize non-image areas—that is, to make them prefer water to ink.
- Corrosion inhibitors, to prevent the dampening solution from reacting with the plate. Magnesium nitrate is sometimes used; it also acts as a scratch desensitizer and buffer (a substance capable of neutralizing acids and bases in solutions and thereby maintaining the acidity or alkalinity level of the solution).
- Wetting agents, such as isopropanol or an alcohol substitute, which decrease the surface tension of water and water-based solutions.
- Drying stimulator, a substance—such as cobalt chloride—that complements the drier in the ink. Drying stimulator is an additive that is used only if ink is not drying fast enough. Typical concentrations are 1-2 oz. of stimulator per gallon (8-16 ml per litre) of dampening solution.
- Fungicide, to prevent the formation of mildew and the growth of fungus and bacteria in the dampening system.
- Antifoaming agent, to prevent the build-up of foam. Foam can interfere with the even distribution of dampening solution on the dampening rollers

pH

- It measures the acidity or alkalinity in a solution
- The pH scale goes from 0 to 14, with 7 being neutral.
- A pH lower than 7 is acidic
- A pH higher than 7 is alkaline, or basic.
- Measured on a logarithmic scale, for example:

pH 5 solution = 10 X more acid than a pH 6 solution pH 4 solution = 100 X more acid than a pH 6 solution

III. CONDUCTIVITY

- A solution's ability to transmit an electrical charge; to measure conductivity, one measure the number of ions in a solution. The higher the ion concentration, the higher the conductivity degree.

It gives an overview of the necessary parts in a good fountain solution, and the advantages of modern fountain solutions: prevention of printing plate surface oxidation; prevention of foaming in printing fountains and in dampening systems; curing of micro scratches on plate surfaces; lubrication of blanket surface; resistance to change of acidity in fountain; formation of protective film on plate surface; clean roll up; and minimum start up waste.

IV. WATER HARDNESS

Water is the most important ingredient of fountain solution and it is the ingredient present in highest percentage. A printer uses tap water as the source material for the fountain solution. This water found in nature is not clean; rather it contains numerous gasses and minerals. If the proportions of these salts are exceeding certain tolerance, the fountain solution ingredients may have to be modified to achieve desired results. The hardness of the water must be calculated before any additives are introduced, since hardness is no longer easily determined in a prepared dampening solution. Test-strips are useful in performing a simple determination of the total water hardness. The proportion of lime in the water can cause the following problems during printing (a) The inking rollers run blank (calcification) (b) Deposits on the rubber blanket (c) Impact on the pH-Balance (d) Fluctuation in the pH-Balance (e) If the proportion of chloride, sulphate, or nitrate is too high, it will lead to corrosion.

Surface tension is an effect within the surface layer of a liquid that causes the layer to behave as an elastic sheet. It is the effect that allows insects (such as the water strider) to walk on water, and causes capillary action. Surface tension is caused by the attraction between the molecules of the liquid, due to various intermolecular forces. In the bulk of the liquid each molecule is pulled equally in all directions by neighboring liquid molecules, resulting in a net force of zero. At the surface of the liquid, the molecules are pulled inwards by other molecules deeper inside the liquid, but there are no liquid molecules on the outside to balance these forces. (There may also be a small outward attraction caused by air molecules, but as air is much less dense than the liquid, this force is negligible.) All of the molecules at the surface are therefore subject to an inward force of molecular attraction which can be balanced only by the resistance of the liquid to compression. Thus the liquid squeezes itself together until it has the locally lowest surface area possible. Surface tension, measured in newtons per meter (N/m), is represented by the symbol γ and is defined as the force along a line of unit length

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perpendicular to the surface, or work done per unit area. The surface tension of ideal fountain solution is about 34 dynes / cm.

V. RESEARCH OBJECTIVE

The Objective of this study is to improve the quality of The Fountain Solution and to study the consumption of IPA free product during printing on different machines in "B. K. Print & Pack, Haridwar".

VI. RESEARCH METHODOLOGY

The whole Study include Total IPA free fountain solution that is used in "B.K. print & pack, Haridwar".

1. Study of consumption of IPA free product during printing.
2. Study of wastage of fountain solution during printing.
3. Improving the quality of fountain solution.
4. To calculating the exact cost of fountain solution during printing on a particular job on different machines.

VII. FUTURE SCOPE

Research focuses on to the quality management & waste reduction during printing in different machines. In all these methodologies, when check list gets adopted number of wastage depending upon the chiller and machine availability. This preliminary result can be used and in future check point suggestions incorporated in the printing section may be indicative for other organizations. They may be modify, Increase or decrease. The factors to be Considered .To implement the suggestions properly we generate a check list in form of table to check the different factors on the different - different machines .And check point helps to reduce the wastage of fount, paper & board with proper quality control .The study may be concluded in a manner that, If all suggestion were implemented for reducing wastage & improving quality will implemented then a positive result will achieved. .

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