

# Requirement Of Paper Quality Suitable For Latest Printing Technology

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## Abstract

Paper having an improved print quality suiting to Print media are very important now days for various printing application specially to agro base paper This paper highlights the parameter settings by using evolution strategies and the efforts made by paper Industry to make agro base unsized paper, compatible for multicolor printing.

**Key Word:** paper printing, offset printing, digital printing, paper quality.

## INTRODUCTION

Today's paper buyers, content creators and printers do not know in advance how a paper will perform on press prior to printing. The printing process has advanced in recent years. Many inputs to the system are measured and controlled in more sophisticated ways resulting in outputs that are more consistent. CTP, closed loop ink systems and on line measurements are a few examples. Color management and unified work flows are current technological advances. However, new information about input variables is required to further advance the printing process. Paper is one of the variables that need further improvement to enable print buyers to predict the outcome of their project and printers to optimize their process.<sup>(1-4)</sup>

Paper classification is based on brightness, a measurement never intended to be a predictor of paper quality. Brightness does not adequately describe paper's critical color reproduction properties. Other classification systems are also inadequate for the purpose.

The target is to characterize paper so that the optimum process is utilized to achieve the desired printed results in high-volume printing (e.g., lithography, gravure, and flexo).

## Discussion

Historically, the paper industry separates coated paper into five categories and uncoated paper into two categories. Currently, key product attributes are brightness, basis weight and finish. TAPPI Brightness is the key measurement placing coated paper into the five categories. However, Brightness does not provide a complete picture of paper's role in image reproduction. The paper landscape has

changed due to recent consolidations in the paper industry which resulted in product changes, product improvements, and changes in the testing methodology. Print buyers are confused by the rapid product changes and do not understand their choices.

Industry organizations try to characterize the papers used in their segment. for newspapers, for publications, and for commercial printing based on brightness, basis weight and surface smoothness... A system is needed to describe paper that relates to the performance characteristics of the product in the modern printing system.

Further, market demands for bluer, crisper papers at competitive prices have driven paper manufacturers to add optical brighteners to their products. These papers require stringent test methods to accurately describe many optical paper properties. Many test devices used within the graphic arts community are not capable of adequately testing these papers. Often, print buyers are unaware of the presence of optical brighteners & related issues.. Matching proofs, which are often on optically brightened papers, to litho papers requires careful control of lighting conditions. Unfortunately, lighting conditions are in need of further characterization and standardization.

Color management or visual appearance by instrument values followed by paper industry do not go hand in hand with printing requirement.

How paper performs in its intended printing process and how paper portrays imagery are key factors in choosing right type of paper.<sup>(5-7)</sup>

## About Printing:

Printing., it is a simple word with a complex meaning. Reduced to the

basics, printing is the transfer of images from one surface or source (printing plate or digital file) to another (paper or other substrate) using a medium (ink or toner).

Till as ten years ago, printers may have been careful to distinguish between printing using an offset press, and copying using an analog copier. But with the introduction of digital copiers, the distinction is becoming much less important.

## Lithography

Lithography is the printing process most widely used today. And most lithography is performed on sheet-fed offset presses. These presses have three same-size cylinders (plate, blanket, and impression) and a dampening and inking system. The cylinders rotate, and the press plate is wet by the dampening system (preventing ink transfer to any part of the plate except the image area) and inked. Then the inked image is offset from the plate to a rubber blanket surrounding the blanket cylinder. The blanket contacts the paper, making a final transfer of the image to the sheet as it passes between the blanket and impression cylinders.

## Digital Printing

Sometimes called electronic printing, digital printing can be accomplished with printer/ copiers that use a laser beam to expose dark areas (representing the image) directly onto a photo (light) sensitive drum or belt. Electrically charged toner particles are attracted to the image on the drum or belt, then transferred to the paper and fused to it with heat and/or pressure. With digital printing, there are no plates.

## Comparison of offset and digital printing processes

Digital printer/copiers operate at a uniform speed, stated as copies per minute. Speed is slowed by sheet size and duplexing (two-sided printing). Presses operate at variable speeds depending on what is being printed. This gives presses and copiers a different economy of scale, and throughput capacity. With copiers, the unit cost stays the same throughout the run, so the first copy costs the same as the thousandth. On a press, the unit cost drops as run lengths increase, so the first sheet can cost significantly more than the last sheet.

### Appropriate Applications for Offset and Digital Printing

A number of technological improvements to copiers raster image processing, microfine toner particles, better control of registration means that the decision to use offset or digital printing no longer depends primarily on image quality. Today's black and white, and color digital copiers produce perfectly acceptable quality for all but premium or showcase printing, and do so at production speeds. To help you determine whether offset or digital printing is best for your project, we've developed an overview of the benefits of each process. Consider this:

- **Offset printing allows** more options for color management. Adjustments to colors printed on a digital copier are hard to make and much more limited than adjustments on press. In addition, there is more chance of variation in color from the beginning to the end of the run on a digital copier than on press.
- **The range of paper stocks is greater with offset printing.** Digital copiers typically use three paper sizes letter, legal, and ledger and cannot feed any others. Enamel or cast coatings on paper can be a problem for digital copiers because of the fusing temperature. Finally, the paper path or the paper pickup system limits the thickness of paper.
- **In general, offset presses run faster than digital copiers.** At high quantities, a digital copier may be too slow to produce the job in the desired turnaround time.
- **Photographs and screens can be printed at a higher resolution on press.** Because press plates can be imaged at a higher resolution than digital copiers are capable of printing,

presses produce finer dots for photographs and screens. This prevents the banding and streaking that can appear in digital printing.

- **Digital printing has less make ready than process color on press.** Because digital color printing requires no plates and only a few sheets to attain good color, it is less expensive in short runs (generally 500 copies or less) and can be produced faster than making plates and printing on an offset press.
- **Digital printing does not require color separations.** This means that a file created in a program that does not support color separations (like Microsoft Word or PowerPoint) can be printed on a digital copier but can't be printed on an offset press.
- **Digital printing supports variable data printing and versioning.** Because there are no press plates, each print from a digital copier is an original and can be unique.
- **A digitally-printed job can proceed straight to bindery.** Because there is no need for ink drying time, a job printed on a digital copier can be folded or cut immediately after imaging.

### About Offset Printing:

It is a process which uses an etched thin, flexible metal plate that fits to a curved cylinder. The inked image is transferred, or offset, from this plate to a revolving rubber covered cylinder, which in turn transfers the image to the paper/board.

### Advantages of offset printing:

Consistent high image quality sharper & cleaner. The advantages of offset printing include: Consistent high image quality sharper and cleaner than letterpress because the rubber blanket conforms to the texture of the printing surface. Usability on a wide range of printing surfaces in addition to smooth paper (e.g., non absorbent substrate). Quick and easy production of printing plates. Longer plate life than on direct litho presses because there is no direct contact between the plate and the printing surface. During the 1950s, offset printing became the most popular form of commercial printing as improvements were made in plates, inks and paper, maximizing the technique's superior production speed and plate durability. Today, the majority of printing, including newspapers, is done by the offset process.

### Colors are used in offset printing:

Ink Colors. Commercial offset printing (also known as offset lithography) utilize four basic ink colors: CMYK. Dots of cyan (blue), magenta (red), yellow, and black (the K) are placed next to each other in specific patterns that trick the eye into seeing millions of colors. Additionally, offset printing can use premixed inks in a variety of specific colors as well as metallic and fluorescent inks. These are called spot colors. Six colors CMYK, O, G can also be used instead of CMYK to get wider gamut. This process is called Hexa chrome printing.

### Types of offset printing:

These are Two Types:

1. Web offset: An offset process in which paper is fed in the form of reel is called web offset printing. There are two types of web offset printing
  - a. Cold set web: A process in which the ink dries by absorption and air.
  - b. Heat set web: A process in which the ink dries by heat.
2. Sheet fed offset
  - a. Sheet feed offset: An offset process in which paper is fed in the form of sheets.
  - b. UV offset: An offset printing process in which UV curing inks/hybrid inks are used for printing on non absorbent substrate.

### Kinds of papers on which printing can be done:

Art paper Gloss · Art paper Matt · One side coated paper · Sticker paper · Light weight coated paper · Maplitho paper · Creamwove paper · Natural shade maplitho · Kraft paper · Pulp board · Coloured printing papers · Coloured pulp cards · Buff card · Strathmore paper · Ivory card · Duplex Board Grey back · Duplex Board White back · Straw board and many more.

### Requirements for Printability of Paper:

#### 1. Flatness:

Paper must be absolutely flat to avoid image distortion. Distortion due to wavy edged paper is very common and causes misregister. Wavy edged paper results, when piles of dry paper are exposed to humid atmosphere and the edges absorb moisture. Tight edged paper results when piles of paper are exposed to very dry

atmosphere and the edges dry out. Distortion can also occur due to uneven distribution of moisture throughout the sheets.

## 2. Grain Direction:

The direction of the grain in sheet papers should be the long way (grain long) of the sheet i.e parallel to the axes of the press cylinders. On the other hand stretch or shrinkage of paper in the direction of feeding can be compensated by shifting the cylinder packing. Therefore since paper stretches or shrinks more in cross direction, hence sheets are fed in this direction. In general it is preferred to print grain-long for black and white too.

## 3. Dimensional Stability:

Paper always stretches or shrinks with change in moisture and content, the paper maker can control it within certain limits. The less the fibers are beaten and hydrated, less dense is the paper, hence less it will stretch or shrink for a given change in moisture content. Too little hydration causes a lumpy paper with low pick strength. There must be some hydration to prevent picking, blistering or splinting on the press. Hydration is thus necessary to bind the fibers together such that it withstands the pull of the ink during printing.

Uncoated offset papers are also surface sized to bind the surface fibers and prevent linting.

It is best to paper of good strength in the short grain direction which can only be achieved with good, fiber to fiber bonding.

## 4. Proper Relative Humidity:

The moisture content of paper is governed by the R.H. of the surrounding atmosphere. Sheet dimensions change with changes in the content. Hence if paper is to remain flat and maintain sheet dimensions, the moisture content of the paper should be in balance with the pressroom R.H.

The equilibrium moisture content varies for different paper. It is affected by the type of fiber, degree of beating, hydration of fiber and the amount of filler of the press coating. Mineral fillers are not hygroscopic, so they reduce the equilibrium moisture content in proportion to the amount present.

The only interest to a printer is not the moisture content of the paper but the R.H. balance of the paper with the pressroom atmosphere.

Generally paper on the moist side gives less trouble than dry paper.

## 5. Moisture Resistance:

Since the offset impression brings the paper into close contact with the moisture blanket, offset stocks must have some degree of moisture resistance. For wet multicolour printing, where there are two or more contacts with the moist blankets in quick succession, the paper must be somewhat more moisture resistant than for single colour printing. Insufficient moisture resistance can cause trouble with both coated and uncoated papers.

## 6. Moisture Absorbency:

This might seem somewhat contrary to the above property, the surface of the paper for offset printing should also be highly moisture absorbent. The reason for this is that the ink image on droplets that must be absorbed into the paper surface before the ink can take hold or trap. Otherwise, these water droplets act as barriers to the ink, preventing complete transfer. As a result, the ink impression, particularly in solids, appears gray or weak.

Lack of moisture absorbency can be caused by greasy or waxy materials in the paper surface. It is usually more troublesome with coated than with uncoated stocks. Unfortunately, there is no simple way as yet to measure or compare stocks for moisture absorbency.

## 7. Adequate Pick Resistance:

Picking and splinting cause serious delays by making frequent wash ups to maintain quality. This could be either overcome by reducing the tack of the ink or cut down the press speed. On uncoated paper, picking can be caused by:

- a) Lifting small clusters of fibers out of the paper surface, these stick to the blanket and ruin the printing on succeeding sheets unless removed. In litho printing, the fibers soak up water, then become ink rejecting and thus produce white spots in printing, particularly in solids.
- b) Lifting of large area of surface fibers. When this happens, paper splits and tears.
- c) Blistering, usually a solid print is ruptured internally and looks and feels rough. Some of these blisters break and allow particles to adhere to the blanket causing spots.

In case of coated papers, picking can occur by:

- a) Lifting of small flakes from the surface of the coating. This occurs when coating does not contain enough adhesive or is too brittle and

tends to crack when sharply bent as the sheet peels off the blanket.

- b) Splitting of the body stock here the base stock has been ruptured due to lack of fiber bond strength.
- c) Blistering of the base stock here no part of the paper may stick to the blanket but the whole printed area looks and feels rough due to internal rupturing. Some of these blisters may break allowing particles to adhere to the blanket and causing spots. Offset paper requires a higher pick resistance than paper for letter press, because (a) Offset inks are tackier than letter press inks; (b) the thinner films of ink used, produce greater pull on the paper's surface; (c) the resilient offset blanket surface performs better than a metal form on the paper's surface and it also exerts a greater pull on the ink film. Also picked particles of paper and coating adhere more firmly to offset blanket and are not easily passed back to the inking system.

## 8. Accurate Trimming:

Unless the edges are trimmed straight and square, the printer is in for register trouble. Bowed edges result from trimming paper which is not flat because of wavy, tight edges. Bowed edges can be directed by placing two sheets on a flat surface with their gripper edges together. If the edges do not touch at all points, the paper should be retained. But make sure that the paper is flat. If it is wavy or tight edged the clamp pressure will be uneven, and the knife will not cut straight. In this case recondition the paper before trimming.

## 9. Freedom from Active Chemicals:

Paper must be free from any active chemicals in any water soluble material which can contaminate the foundation solution or cause damage to the printing plate or to the ink water balance during printing.

In paper manufacture, the only harmful chemical used is alum, which if used in excess makes the paper acidic. Such paper can counter tech plates and cause scumming. But with pH control this never happens, and very seldom uncoated paper has a pH below 4.7 and with modern printing plates, paper with 4.5 pH can cause no counter etching trouble.

In case of coated paper; the counter slip applied to the base stock is alkaline. Therefore, it has no chemical counter etching effect on printing plates.

## 10. Good Ink Drying Qualities:

There are five ways an ink on a press

may not dry satisfactorily they are :

a) Not enough ink drier; b) Too much moisture; c) Too much acid in the fountain solution; d) Too much acid in the paper; e) Too much ink resistant in the paper.

The first one depends on the ink maker; the second and third on the printer and the last two on the paper manufacturer.

Paper can also affect ink drying. In the case of uncoated papers the main retarder of drying is acidity. Papers having a pH of between 4.5 and 6.0 rarely give trouble.

But below 4.5 can cause serious trouble, specially in humid weather.

In coated papers, the acidity of the base stock has little if any effect. It is the coating that determines how fast ink will dry. Most offset coatings are neutral and alkaline, and the more alkaline the coating is made, the faster ink will dry on it. Provided the coating is satisfactory in all other ways. But coating pH is not the only factor. Ink can dry differently on paper of the same coating pH from different mills, and the reason is not yet known.

### 11. Uniformity in Ink

#### **Absorbency:**

The rate of setting of ink is not a criterion of good offset paper. It is possible and practical to tailor or adjust ink to print on a wide variety of surfaces, from highly absorptive to non-absorptive. What is important is uniformity on ink absorbency (a) over the surface of a paper (b) from sheet to sheet in given lot of paper; and (c) from lot to lot of paper; of the same brand and finish. Only with this assurance can the printer operate efficiently with assurance of uniform quality and freedom from set-off and chalking troubles.

### 12. Freedom from piling:

Piling occur with coated papers, usually the coating adhesive is too water soluble, like starch coatings; With uncoated paper, the unbonded mineral filler is picked by the blanket from the paper, forming an abrasive layer over the blanket. This wears the desensitizing film off the non-images areas of the printing plate eventually causing scumming.

### 13. Freedom from Lint, Powder and Dust:

Linting is caused by surface fibers on uncoated papers that are not firmly bonded to the sheets. In picking it is the odd fibers here and there which is not firmly bonded. Linting is uniformly throughout and is worse on

the wire side than on the felt side. Sometimes Linting occur on the third or the fourth pass during colour printing, this is due too the starch surface size, which begins to soften up by moisture which becomes more marked as the multicolour process continue.

Powdering occur in both coated and uncoated papers. This result from a heavily loaded paper, with excess of mineral filler added to enhance opacity. This is due to insufficient surface size. This defect can wear the printing plate and cause scumming.

Dusting is caused by loose particles of paper or coating laying between the sheets. This is usually caused during slitting, trimming or chopping operation.

### PRINT QUALITY IN RELATION TO PAPER PROPERTIES

The paper properties which affect print quality are :-

#### 1. Colour:

Paper can be made of any desired colour, but for colour process reproduction, white is the best. Any colour in the paper will lower contrast and detract colour values, particularly colours more or less complementary to it in reproduction.

#### 2. Brightness:

It is the percentage of the white light falling on the paper that is reflected to the eye of the viewer. It contributes to the contrast in the printed subjects and therefore, to brilliance, snap and sparkle. Brightness must be uniform; any variations in it will detract print quality, most noticeable in large areas of half-tone tints.

#### 3. Opacity:

Determines the amount of "show-through" of printed matter on the reverse side of the paper and the paper's ability to hide the printing on an adjacent sheet. Lack of opacity reduces contrast and lowers print quality.

#### 4. Smoothness:

Smoother the paper's surface, the thinner the ink film required to cover it, the better the rendition of tones, greater the sharpness and clarity of detail.

#### 5. Gloss:

Is the property of paper surface that makes it reflect light. It is related to smoothness but is not the same thing. Gloss is optical whereas smoothness is physical. High gloss papers produces the best tone and colour value but are unsuitable for reading

matter because of glare. Paper gloss has an important effect on the gloss or finish of the printed ink film. Ink gloss is always higher on glossier paper. If the ink films of equal thickness are printed on paper of equal ink absorbency.

### 6. Refractiveness:

The refracting qualities of different materials can be measured and each have been given a rating which is called " refractive index ". A material that bounces the refraction back to the eye and thus preserves brightness is given a high index. A material that bends the reflection to one side or gets scattered causes also of brightness and is given a low index.

### PRINTING & PAPER TROUBLES & HOW TO OVER COME:

#### 1. Selecting paper and Ink:

Most printers work with a wide variety of papers. Most of the times they select the paper depending upon the requirements, but on some occasions the customer chooses it because he likes the colour, feel or finish even though he has no knowledge of printing. However, it then become the printer's job to select and adjust the ink to the paper, that is so desired. The ink must print well and dry well without set-off, have the desired finish and the printed job must meet the requirements of end use. These requirements must be light-fastness; fastness to alkali, or alcohol, spirit varnish or lacquer; rub proofness etc. For such diversified requirements, the printer must rely on an ink maker for advice and help, unless an ink experts is at hand to carry out the necessary tests in the pressroom before undertaking the bulk printings.

#### 2. Register Troubles:

Could be due to either improper mechanical press adjustment or lack of perfect flatness in paper.

The only factor which will be considered here will be due to paper and it will be assumed that press adjustment were properly carried out. If the sheet is wavy or tight edged, it is distorted in printing and impressions do not have the same dimensions as the plate image. Where two or more printing are necessary, the cause of misregister is due to distortion in the first printing. It is usually not discovered till the second printing when the colour fail to fit. Modern four colour presses can handle moderately wavy and tight

edged sheets quite well, since press moisture and atmospheric conditions do not have time enough to change the conditions of the sheets between printings. When two or more printings are required, register must always be checked at the start of the first printing. This is done by the measuring the length of the impression along the back edge of the sheets and comparing this with the corresponding length of the plate image. There is a special register ruler for this purpose. If the impression is longer, the sheet was wavy; if shorter, the sheet was tight edges. A long impression due to wavy edged paper is by far the most common trouble. When it occur there is a choice of four things which can be done to overcome it.

- Recondition the paper by handing. The waviness in the first place can be prevented by checking the paper's moisture balance and conditioning it before printing it.
  - Use heat lamps and electric strips heaters on the sides of the feeder pile. Heating the cross grain edges of the sheets drives out moisture and shrinks them. This remedy works very well when the waviness is slight, but frequent checking of impression is necessary.
  - Cut the blanket packing along the side edges wherever possible. This relieves the pressure and reduces distortion by permitting the edges of the paper to slip in the impression.
  - Shorten the gripper edge of the sheets by putting a slight kink in them at the front guides. This remedy also works best when the sheets are only slightly wavy.
- A short impression due to tight edge is much less common and trouble some. The best method is the recondition the paper by hanging. Register trouble is very likely to

occur in printing embossed, pebbled and cockle finish papers.

#### 4. Linty and Dusty Papers:

In printing some uncoated papers, the ink areas of the blanket pick up surface fibers. These quickly work their way throughout the inking system and foul it up. White, fiber shape spots show up in the printed solids, halftones become grainy, and frequent wash-ups are necessary. This condition is sometimes called lint, fuzz, fluff or whiskers. Linty paper is the result of insecure bonding of surface fibers. Reducing the tack of the ink very rarely helps. To avoid trouble, the best things to do are to check for lintiness before printing and reject if unsatisfactory. Under desperate conditions size the paper with Laketine or aluminum hydrate ink before printing, paper, surface sized with starch is not always the answer to linting, specially litho printing. Always test the paper for wet-rub resistance before printing. Dust in paper is due to loose particles on the sheets. Usually it is siltier or cutter dust. It can be present in both coated and uncoated papers. This can be easily recognised because they are not like clumps of fibers or chips of coating, they shows up as spots and are not fiber shaped.

#### 5. Picking or Picking, Blistering and solitting of paper:

It occur s mainly in solids, rarely in halftones unless the paper is very weak. Paper must always be tested for pick resistance before printing.

#### 6. Set-off :

It can occur under the following condition

- When setting of the ink is too low. This may be due to lack of absorbancy of the paper, of the ink vehicle which penetrates too slowly.

- When heavy paper is printed and pressure in the delivery pile builds up rapidly
- When gloss inks are printed.
- The speed of the press and the distance between the printing unit and the delivery pile.

Set-off trouble is ever unencountered, the following remedies may come in handy.

- Mix a stronger ink and reduce the mount run.
- Add a small amount of reducer of anti-offset compound to the ink.
- Replace ink with a quick-set ink.
- Use anti-offset spray, but use as little as possible either wet or dry carton board.

#### 7. Slurring and Doubling:

It occurs in printing coated stocks, seldom with uncoated stocks it has certain characteristic by which it can be recognised: it is usually towards the back edge of the sheet, it causes halftone shadows to fill in and lose detail, while high-lights are unaffected, the back edge of solids are fringed instead of being sharp. To prevent slur, the back cylinder pressure should be as possible but still produce a good impression. Also minimum of ink should be run. The more ink, the greater its lubricating effect and the greater its tendency to slur.

Doubling differ from slur in three stage a. it appear in the highlights as well as in the shadows: b) it varies from sheet, causing tone and color variations c) it occurs only in multicolor press work.

#### 8. Piling:

The cause of piling is lack of sufficient moisture resistance of paper coating.. these are of two types:

- piling on non-printing areas.
- piling in printing area. Piling on non printing areas of the blanket may occur in the case of uncoated papers



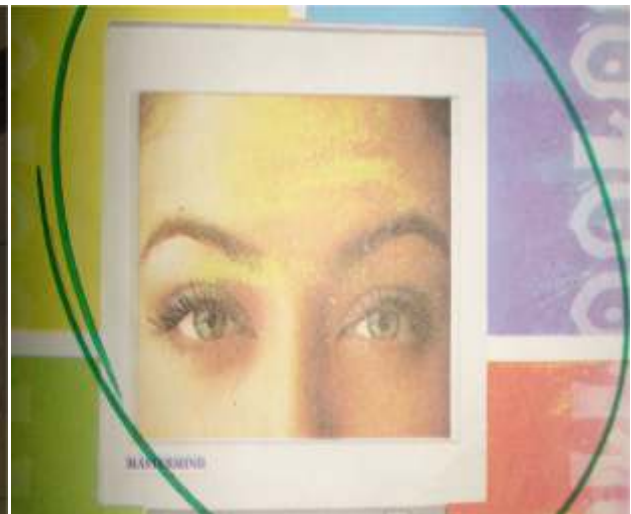
Printed Sheet



Enlarged View



Defected Printed Sheet



Defected Enlarged View



Photograph showing the ink densities

when their manual filler is not properly bonded and retained in the fibrous structure of the sheet. But most piling troubles occur on coated paper, whose superficial adhesive coating lacks moisture resistance and due to moist blanket in litho printing. To remedy this defect, the coating adhesive must be harder and less moisture absorbent. Piling is a papermaker's problem. Piling can be prevented by the printer by sizing the sheets with laketime or suitable transparent varnish prior to printing.

#### 9. Curl:

Curly paper prevent proper feeding and delivery of sheets on the press. These are three types of curl. a) Reel curl is very rare these days if encountered there is nothing on can

do expect sort them out or reject such paper. b) Moisture curl, all the printer can do is to cut his plate moisture to a minimum, but some papers just have a curling tendency to which nothing can be done. c) in permanent , it is possible to reduce it by flattening the sheets this is best done by reversing the sheets, and feed them through an offset press, using a blank plate and dampening only. If the same amount of moisture is applied to the back of the sheets as is done in printing, the sheet should lose their curl.

#### 10. Embossing of solids:

This occur in printing thin, relatively weak papers and is caused by the strong pull of the tacky inks as the solid areas are somewhat stretched off the blanket. Embossing can be

avoided by using strong. Stiff paper and if this does not work satisfactorily, use of hard blanket may be helpful.

#### 11. Printing lacks uniform finish or color:

This depend both on the paper and the ink. a glossy ink on a highly absorbent paper will not show any gloss. A conventional ink will show a much higher finish on a non absorbent paper. The papers surface must be uniformly ink absorbent to obtain uniform gloss or color but if it the paper is non-uniformly ink absorbent, the printing particularly in solids have a mottled or galvanized appearance. Hence when paper fibres are not uniformly distributed and have not been given sufficient beating, the



Photograph showing before and after 5000 print

printing ink penetrates unevenly and hence takes a non-uniform finish. Even distribution of fibres can best be observed when it is viewed by transmitted light. If the distribution is not too good, mottled appearance of solids can be minimized by adding gloss varnish to the ink, provided the paper does not pick and off set setting is not a problem.

### 12. Scrumming of Printing Plates:

when the paper is too acidic or alkaline, results, but with better control of pH these days in paper manufacture, paper pH as a cause can be ruled out. It is generally due to form rollers that are improperly set or could be due to dirty dampening rollers that have been fouled up with too greasy ink. Paper can cause scrumming if it transfers gritty or abrasive material to the off set blanket causing it to wear the desensitizing film off the non-image areas of the plate.

### 13. Tinting or wash Scum:

it can also be due to ink becoming emulsified in the plate moisture and prints a light tint over the paper where it should be blank. This tint is uniform. Scrumming could be easily washed off the plate with a wet sponge, but quickly returns when printing is resumed, then the cause is not scrumming but tinting. Tinting rarely occurs in uncoated papers, but is a problem with coated papers.

Water soluble surface active agents in the coating of the paper are a contributing factor to tinting. But paper is not always to blame. An ink which is too soft, or tends to become waterlogged one that has been freshly made and has had no time to age can cause tinting. Ink as a contributory factor can be easily seen in multicolor printing where one ink would tint and the others will not, then such an ink should be replaced. If paper was the contributory factor then all the inks of that multicolor print would tint. Too much drier in an ink can lower its moisture resistance and thus increases the tinting tendency

### Conclusion:

Printing technology is developing very fast and since pressure is on for paper quality. Linting or dusting is an area where focused efforts are required to minimize this problem, specially in unsized agro base paper. wet end additives and dry strength resins may somewhat address this problem. However joint efforts are required by paper maker, scientists and specialty chemical manufacture to overcome this problem by selective pre-auditing of wet end chemistry for the betterment of agro base paper industries.

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