Alkaline Sizing & Our Mills' Experience

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ABSTRACT

Since inception, JKPM has been using only the rosin-based sizing system. Neutral / alkaline sizing of paper was first introduced in the mills in the late 90s. To meet the growing market demand for high bright writing and printing papers, JKPM introduced AKD sizing in certain selected grades to enhance their brightness and aesthetic value, which was previously not possible with the traditional acid sizing. However, the volume of AKD sized paper produced was very low.

When the Off-line Coater was commissioned in November 2004, the requirement came for manufacture of alkaline base paper and board. Therefore, PM1 was converted to AKD sizing. The initial trials were fraught with a lot of runnability problems and increase in wear-and-tear of the forming fabric. These issues were sorted out after trials with different suppliers' AKD, changing from GCC to talcum, etc. However some productivity issues still remained, like, breaks, drying limitation in certain grammages, etc.

Continual improvement has always been our culture at JKPM. In tune with the market demand, we wanted to upgrade our branded product JKCopier to a brighter and more aesthetically pleasing product. Our obvious choice then was AKD sizing. During this period, trials were taken on PM3, where most of our copier was made. The problems that followed ,were more than what we anticipated. Productivity was low due to breaks at size-press and severe runnability problems were experienced at the converting stage (Wills Cutters) due to slipperiness of the AKD sized paper. Ultimately, the trials were discontinued with AKD, and we started looking for other alternatives i.e ASA Sizing.

ASA sizing, is reputed to be not so user-friendly. However, we took the challenge and started trials on PM3 in April 05. The initial phase was very problematic, with a lot of runnability issues to deal with. Never the less, ASA was well-established in PM 3 & PM 5 within a period of 3 months. And by December 2006, we converted even PM1 to ASA sizing followed by PM4.

This presentation describes our journey from Acid Sizing to ASA Sizing.

INTRODUCTION

Prior to the beginning 19th century the penetration of liquid into paper was controlled with water-soluble polymers such as gelatin. The use of hydrophobic chemicals into the pulp slurry was first introduced in the early 19th century by reaction of saponified rosin with aluminium sulphate with pH 4-5. Till 1970 it was the most conventional method of developing sizing. The main driving forces which compelled in paper makers to go for Neutral /Alkaline sizing can be summarized as below.

- Ageing affect in paper in acid sizing was high.
- Calcium carbonate cannot be used as filler.
- Corrosion on machine equipments
- Reduce the brightness of paper
- Sizing cost is high.

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ALKALINE SIZING

In alkaline sizing (pH 7-9) hydrophilic parts of alkaline sizing agent react with cellulose fibers the hydrophobic components of the sizing agent sticks out to make the cellulose fiber repel water. The three most common types of cellulose reactive sizing agents are AKD, ASA and fatty acid anhydride products. All three types of agents are amphipathic molecular that consist of a hydrophobic group and cellulose reactive polar group. The latter functionality readily react with cellulose fiber surfaces under typical paper making drying condition to form a covalent ester bond which firmly anchors the sizing molecules to paper fiber surfaces.

Cellulose reactive sizing agents perform best in a neutral- to- alkaline papermaking environment and in the absence of appreciable alum. In addition to the cost- performance advantage, benefits of "alkaline papermaking" include the use of calcium carbonate as a filler, a potentially stronger sheet, reduced corrosion of equipments, improved sheet permanence and environmental benefits due to improved system cleanliness.

BENEFITS CAN BE SUMMERISED AS BELOW

- Sizing can be done at a wide pH range ie, 4.8 to 8.2 for ASA.and 7 to 9 for AKD
- Improved paper quality, strength and higher ash levels
- Suitable to all types of filler i.e., Talc, GCC, PCC, Clay, etc
- Total acid free system with nil/negligible use of alum
- On machine sizing is achieved
- Long shelf life as emulsification is

done on site

- Suitable to all types of furnish
- Corrosion reduction
- Use of CaCO3 as a filler
- Potential cheap fiber substitution
- Increased filler levels-Ash 15-25%
- Potential production increase
- Improved retention
- Potential energy reductions
- Cleaner system
- Environmental benefits

To the end user

- Improved sheet brightness - Fine paper.
- Improved printability - Fine paper.
- Possible improvement to strength/rigidity - Board.
- Improved ply bond - Multi-ply board.
- Improved edge wick - Liquid packaging board.
- Improved ageing-longer lasting paper.

AKD (Alkyl Ketene dimer)

AKD originates from Palmitic Acid and Stearic Acid. These fatty acids come from animals with carbon chain length of 16 and 18 respectively. AKD is a white liquid, factory produced emulsion contains 10-15% active AKD. Because of slow rate of reaction AKD does not provide on machine sizing. However, due to the strong covalent bond that it forms with the cellulose, it provides good resistance to both acid and alkaline penetrants.

The following factors play an important role in understanding and optimizing AKD.

1. AKD emulsion (diluted or as such) is best added close to the fan pump.

2. Cationic Starch is very useful in not only in retaining size particles; it also stabilizes the AKD molecule and helps in its adsorption to the fiber and filler surface. This property is particularly useful when GCC is used as filler. Retention aid will help in both the retention of size as well as filler.

3. A smoother dryer temperature profile will help in proper distribution and orientation of AKD over fiber. The melting point of AKD is 40-50^{o}C.

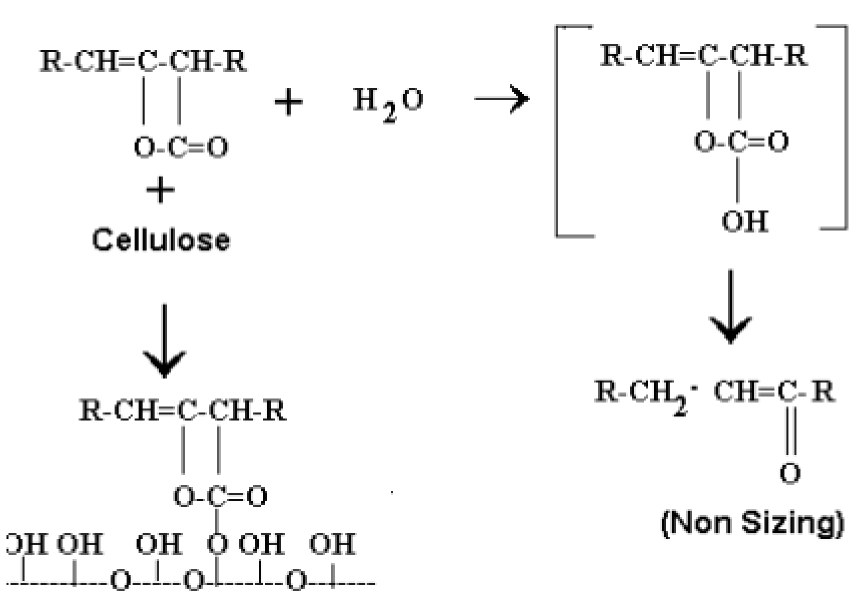
Advantages

- Works at neutral to alkaline pH.
- No on site preparation is required.
- Independent of alum.
- Brightness development.

Pitfalls

- Does not provide on machine sizing.
- Makes paper slippery
- Causes foam
- Short shelf life.

AKD REACTIONS



ASA(Akenyl Succinic Anhydride)

ASA is a yellow oily product, prepared with α-olefin (C-16 to 20) and maleic anhydride. It is insoluble in water, but chemically highly sensitive to it. Emulsification of ASA is must and same is done using a synthetic Cationic Polymer or Cationic Starch & a small amount of surfactant.

Factors affecting the quality & stability of emulsion are :

- Temperature : Less than 25^{O}C
- pH : 3-5
- Particle Size : Small. Less than 1 micron
- Particle Distribution : Uniform
- Life : Maximum 3 hrs

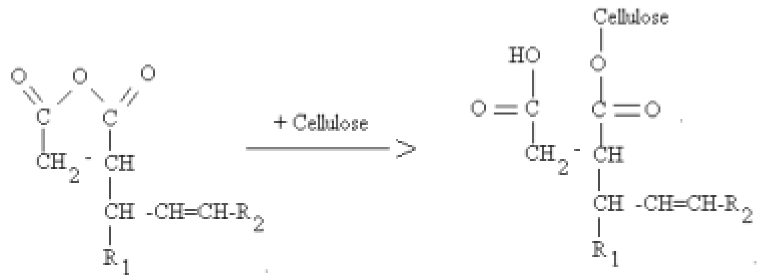
ASA is more reactive than AKD both to cellulose and water. Hence sizing develops on machine.

Due to rapid hydrolysis of ASA Emulsion the product is usually transported in its pure form and is emulsified on site. Onsite emulsification requires an activator (stabilizer) and a surface active agent. Cationic Starch in the ratio 1:2 (ASA:Starch) serves the purpose well. ASA molecules react with the OH group of cellulose at room temperature to produce good sizing. However, the same molecule can react at room temperature with a water molecule and produce hydrolyzed ASA, which is a very sticky material and an anti-sizing agent. The addition of alum moderates the later reaction as given on next page.

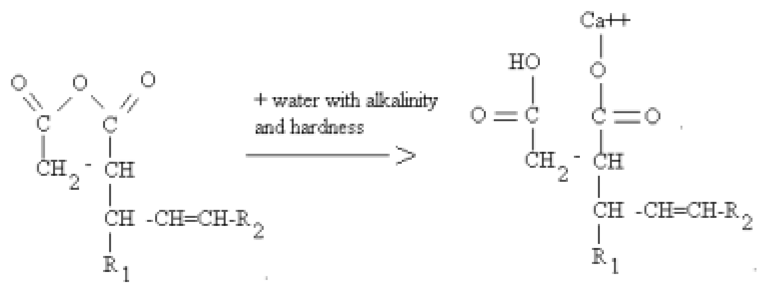
Factors affecting sizing

- Type and amount of filler-As the surface area of fillers increases, the size requirement increases.
- GCC 2-4 m^2/g
- PCC 8-12 m^2/g
- Talc 14 m^2/g
- By increasing ash% from 10 to 20% - ASA increases by 23% to get same size level.
- Increase in Coated broke from 10 to 40% - ASA increases by 11% to get same size level.
- pH of system
- Degree of refining & drainage on wire
- Retention of fiber, fines & fillers.
- Drying temperature & profile.
- Rate of Hydrolysis of ASA is

Reaction with Fiber



Hydrolysis Reaction



COMPARISION OF AKD AND ASA SIZING SYSTEM

Sl No	Particulars	AKD Sizing	ASA Sizing
1	Physical State at room Temperature	Wax Dispersion	Oil
2	Emulsification requiremnt	Not required	On site emulsification required
3	Shelf life of emulsion	Few months	3 Hours
4	Requirement of cationic carrier	Yes	Yes
5	Working pH	Dependent(7-9)	Flexible(4.8-8.2)
6	Reactivity to Hydrolyze	Slow	Fast
7	Tendency to Hydrolyze	High	High
8	Size Development	Slow	Rapid
9	On Machine Sizing	Not feasible	Feasible
10	Temperature requirement to develop sizing	More than ambient Temperature	Ambient Temperature
11	Foaming Potential	Yes	No
12	Slipperiness in Paper	Yes	No
13	Deposit potential	Yes	Yes
14	Size reversion	Yes	Yes
15	Excess unreacted size in Paper	Hydrolyze to Ketone which also imparts sizing	Quickly hydrolyze to di-carboxylic acid which detrimental to sizing
19	Hydrolyzed size	Produces stickies	Produces white pitch & deposits
20	Cost of Sizing	Slightly higher or equal to acid sizing	Equal or cheaper than acid sizing

quicker at higher pH (>8) Rate of Hydrolysis of ASA is slower at lower pH (<6). Hydrolsylate of ASA reacts with Ca++, Mg++ & Na+ to give compounds, which are surface active, & hence reduces sizing. High level of Hydroxyls OH- will increase the pH to high level (>9) which will favour hydrolysis of ASA (NaOH, $Ca(OH)_2$, and excess Na_2CO_3).

- Alkalinity is good for both AKD & ASA sizing. But source of alkalinity plays a major roll.
- Fillers, Fines, Fibers have a finite cationic demand & other chemicals / additives are cationic.
- If the system cationic demand is High, the cationic ASA / AKD will not be retained.
- ASA emulsion it self can contribute towards cationicity of the system particularly when it contains polymer of medium or higher charge density.
- Anionic trash: Gives sizing problem in all type of sizing (Rosin, AKD & ASA).In case of ASA, the ASA particle will adhere to anionic trash. Hence retention of anionic trash (fines or fillers) is very important in ASA sizing.
- ASA / AKD particles are cationic & are covered by a layer of colloid (starch / polymer) which protects them from heat.
- Above 60 ^{o}C, the size particles losses its stability. (45^{o}C for AKD)
- The ASA/AKD particles become more mobile & the particle breaks exposing the AKD / ASA particle to heat, water at alkaline pH. ASA gets hydrolysed fast. Thus looses sizing efficiency.
- Fugitivity (Loss of Sizing) : In system (system is highly anionic/ high anionic trash).In ASA sizing, it happens due to hydrolysis of ASA due to high pH environment caused by high moisture & $Ca(OH)_2$ entrapped in PCC.
- Defoamer:-Adversely affects sizing by absorbing them (oil / kerosene based).Surface active agents contained in defoamer destroys sizing when used in excess.

Advantages

- Works over a broad pH range of 4.8 8.2.
- Can be used with little quantity of

COMPARATIVE PAPER PROPERTIES & PARAMETERS IN COPIER PAPER ACID SIZING VS. AKD SIZING

Particulars	Unit	ACID SIZING	AKD SIZING
Machine Conditions:			
FPR	%	80-85	85-90
FPAR	%	50-55	55-60
Hbox Cationic Demand	gm/L	40-50	50-70
pH		3.5-4.5	7.0-7.5
Alkalinity	ppm	NIL	150-200
Paper Temperature before Size Press	^{o}C	70-75	75-80
$Cobb_{60}$ before Size Press	gm/m^2	40-50	NIL
Consumption:			
ROSIN	kg/T	12-16	-------
WAX EMULSION	kg/T	6-8	-------
Alum	kg/T	25-30	NIL
AKD	kg/T	-------	10-12
FIXING AGENT	gm/T	-------	50-100
RETENTION AID	gm/T	-------	10-12
Paper Properties			
Ash	%	11-12	11-12
$Cobb_{60}$	g/m^2	23-25	24-26
Bulk	cc/gm	1.35-1.37	1.35-1.37
Brightness	%ISO	91-92	94-95
Fluorescence	%ISO	6.5-7.5	8.5-9.5

Dosing Points were as given below (For ASA Sizing)

1	ASA	1st stage cc accept line
2	Fixing Agent	1st stage cc accept line along with ASA
3		Machine Chest
4	Retention Aid	Pressure Screen Inlet
5	Alum	White Water Channel

alum

- Does not make slippery paper
- Provides on machine sizing.
- Acts as a defoamer
- 100% actives as received
- Less fluff generation

Pitfalls

- On site emulsification
- Deposits can be a problem.

OUR MILL EXPERIENCE

Why for Alkaline sizing in JKPM

- We were not able to increase paper brightness in Copier grades to more than 91% in Acid sized papers and 88% in SSMaplitho papers. The market required higher brightness paper.
- Cost of sizing was very high in some machines with conventional acid sizing.
- Color reversion and Ageing effect of all variety of paper was high inviting more market complaints.
- More fluff generation at initial paper dryers was inhibiting production rates

Continual improvement in quality of paper is our culture at JKPM. In order to upgrade the paper quality with respect to optical properties and aesthetic value simultaneously reducing its cost, JKPM opted for AKD sizing. Trials were conducted on different machines. As AKD permitted an alkaline pH range, we used GCC as a filler during the trials. The trials were a huge success, and AKD replaced Acid Sizing, although only in certain special varieties like Bond papers. However, the production of these special varieties accounted only for about 7-10 days per month on PM 4 & 5, and problems if any had not surfaced and evident at that time due to the short runs.

With a continuous need to upgrade quality, the decision to convert both PM1 & PM 3 to AKD was ultimately taken. Trials commenced on PM1 with AKD and GCC as filler in October 2004, with a view to supply alkaline sized paper to our upcoming Off Line Coating Plant. The Coating Plant was commissioned in November 2004. In Copier Grades AKD Sizing trials were taken early next year i.e in 2005.

Upon continuous running on these two machines, the problems posed by AKD Sizing were much too evident. Slipperiness of paper, drying limitations, off machine sizing, etc, were some of the factors that led us to look for an alternative method.

The journey from Acid to ASA is described below:

Our Experience with AKD

- We started alkaline sized paper in PM 4 & PM 5 in 1998-99 for the manufacture of special grade writing and printing paper and Bond papers.
- Based upon the above experiences we started trials of AKD sized paper on PM1.
- After commissioning of Coating Plant in November 2004, PM1 was dedicated to manufacture of Base Paper which was required to be alkaline sized. Hence all products on PM1 were AKD sized with GCC loading.
- Initially we faced runnability problems in the form of breaks at presses due to severe picking and also breaks at size press. AKD consumption was high. Gradually this was reduced by repeated trials of AKD sizing of different suppliers.
- Upon continuous running the following problems were encountered.
    - o Breakages at couch and press were more due to picking problem.
    - o Faster wearing of press roll doctor blades.
    - o Heavy deposits in the system. Backwater silo, centricleaner pits, etc leading to blotches, lumps and breakages.
    - o Severe clogging of felts.
    - o Severe wear out of wire return roll doctor blades,

Given below are the dosing rates of chemicals, machine parameters which were maintained and paper properties (With ASA Sizing)

Machine Parameters	Unit	
Machine Speed	m/min	290
Prod Rate	T/hr	4.8
Cobb before Size Press	g/m^2	40-50
FPR	%	80-90
FPAR	%	50-60
Hbox Cationic Demand	gm/L	30-60
pH		6.5-7.0
Alkalinity	ppm	50-150
Consumption:		
ASA	kg/T	1.1-1.4
Fixing Agent at cc accept	gm/T	50-100
Fixing Agent at machine chest	gm/T	150-200
Retention Aid	gm/T	20-30
Alum	kg/T	3 - 4
Paper Properties		
Ash	%	11-12
Sizing	g/m^2	21 - 25
Bulk	cc/gm	1.33-1.37
Brightness	%ISO	93.8-94.8
Fluorescence	%ISO	8.5-9

The 2nd phase trial was taken on PM 3 in June-06 in JK Copier paper followed by trials on PM 5 in Copier and Maplitho papers (With ASA Sizing)

Machine Parameters	Unit	
Machine Speed	m/min	290
Prod Rate	T/hr	4.8
Cobb before Size Press	g/m^2	40-50
FPR	%	87-88
FPAR	%	58-60
Hbox Cationic Demand	gm/L	25-40
pH		6-6.5
Alkalinity	ppm	50-100
Consumption:		
ASA	kg/T	1.1
Fixing Agent at cc accept	gm/T	50-100
Fixing Agent at machine chest	gm/T	100-150
Retention Aid	gm/T	10-12
Alum	kg/T	3.5-4.0
Paper Properties		
Ash	%	11-12
Sizing	g/m^2	23-25
Bulk	cc/gm	1.35-1.37
Brightness	%ISO	93.5-94.5
Fluorescence	%ISO	8.5-9

press roll doctor blades, etc.

- o Wire life reduced from 83 days in acid sizing to 25 - 30 days in AKD sizing with GCC.
- o Average machine production dropped Oct-04 to Feb-05
- o The abrasiveness of GCC and talcum were evaluated. It was found that the abrasiveness of GCC was very high (39-80mg/cm^2) compared to talcum (15-16mg/cm^2).

- In view of the above we decided to try talcum in place of GCC, which was implemented since February 2005 to overcome high wearing of wire and doctor blades. The results were encouraging
  - o Average wire life increased to 90 days, which is normal.
  - o Production increased to near normal levels by April 05.
  - o Again trial conducted with different suppliers' AKD in May05 and June 05.
  - o Process Conditions were optimized and maintained :
  - o AKD consumption reduced to 10-12 kg/T
  - o Fixing agent dosed at 50-100 gm/T
  - o pH was 7.0-7.5, FPR 88-92%, FPAR 58-60% and Cationic Demand was 50-60 mg/L
  - o Retention aid addition was stopped as M/c wire retention was already high i.e>90%
  - o Coated Broke Treatment Chemical started.
  - o Boilouts planned and execuated in complete loop.
  - o Average production increased from July 05 onwards by 10-15 TPD.
- Trials were taken on PM 3 for AKD sizing in our branded product JKCopier during February 2005, but was discontinued due to
  - o Low productivity at machine due to breaks at size press
  - o Drying limitation in post dryer section.
  - o Slipperiness of paper at Wills Cutter which severely affected productivity and caused other size variation problems.

COMPARATIVE PAPER PROPERTIES & PARAMETERS IN COPIER PAPER
AKD SIZING VS. ASA SIZING

Particulars	Unit	AKD SIZING	ASA SIZING
Machine Conditions:			
FPR	%	85-90	87-88
FPAR	%	55-60	58-60
Hbox Cationic Demand	gm/L	50-70	25-40
pH		7.0-7.5	6-6.5
Alkalinity	ppm	150-200	50-100
Paper Temperature before Size Press	^{o}C	75-80	80-85
$Cobb_{60}$ before Size Press	gm/m^2	NIL	50-60
Consumption:			
ASA	kg/T	-------	1.0-1.1
AKD	kg/T	10-12	-------
FIXING AGENT	gm/T	50-100	150-250
RETENTION AID	gm/T	10-12	10-12
Alum	kg/T	NIL	3.5-4.0
Paper Properties			
Ash	%	11-12	11-12
$Cobb_{60}$	g/m^2	24-26	22-24
Bulk	cc/gm	1.35-1.37	1.35-1.37
Brightness	%ISO	94-95	93.5-94.5
Fluorescence	%ISO	8.5-9.5	8-9

COMPARATIVE PAPER PROPERTIES & PARAMETERS IN COATING BASE
AKD SIZING VS. ASA SIZING

Particulars	Unit	AKD SIZING	ASA SIZING
Machine Conditions:			
FPR	%	88 -92	86-88
FPAR	%	60-70	58-60
Hbox Cationic Demand	gm/L	50-60	20-35
pH		7.0-7.5	6-6.5
Alkalinity	ppm	150-250	50-100
Paper Temperature before Size Press	^{o}C	75-80	80-85
$Cobb_{60}$ before Size Press	gm/m^2	NIL	50-60
Consumption:			
ASA	kg/T	-------	1.0-1.1
AKD	kg/T	10-12	-------
FIXING AGENT	gm/T	50-100	20-30
RETENTION AID	gm/T	8-10 / NIL	NIL
Alum	kg/T	NIL	12-14
Paper Properties			
Ash	%	11-12	13-15
$Cobb_{60}$	g/m^2	22-24	24-28
Brightness	%ISO	89-90	90-91.5
Fluorescence	%ISO	5.5-6.5	6-7

JKPM's Next Step-ASA Sizing

OUR EXPERIENCE WITH ASA

As the shelf life of ASA emulsion is very low and it gets hydrolyzed very fast, on site emulsification is being done inside the mill. Emulsion is prepared with cationic starch and ASA in the ratio 2:1. Adipic Acid is used to lower the pH, maintained 3.5 by adding alum to the emulsion. The ASA and cat-starch is fed to turbine pump along with primary and secondary water to produce emulsion of 10 -11 gpl.

The first trial of ASA was carried out for 14 days in JK Copier in PM3 in April 06.

Trial Findings

- o Brightness of paper was increased by about 1.5 - 2 % ISO with the same OBA dose as in Acid Size.
- o 10% reduced steam demand as 70-80% on machine sizing development was there.
- o No problems faced at converting section with respect slipperiness, size variation, packing problems, etc in Wills Cutter.
- o Fluff generation was greatly reduced.
- o Comparative results are labulated at left.

The Problems faced during ASA Trial

1. High FPR resulting clogging of felts.
2. Severe picking at press and granite roll. This was more so after m/c startup.
3. Deposition of hydrolyzed ASA in the pipe lines.
4. Poor on machine sizing development.
5. Reverse Sizing (Fugitive Sizing)

Steps taken to rectify the above problems

1. FPR was optimized at 87-88% by adjusting Retention Aid.
2. High pressure oscillating shower and online felt cleaning chemicals started.
3. ASA dosing fine tuned to avoid excess ASA .
4. Alum dosing optimized.
5. Variation in broke addition minimized.
6. pH, H Box Cationic Demand, FPR, etc controlled.
7. Acid Boilout followed by Caustic Boilout started on full loop covering the entire system at regular intervals.
8. The pipes were found to be deposited with hydrolyzed ASA lumps which get released and jam the filter. Hence standby lines provided which were changed and cleaned at regular intervals.
9. Feed lines of suitable diameter were used so as to maintain an ideal emulsion feed velocity 1.5 feet/sec to minimize deposition.
10. When machine restarts after a stoppage, severe press picking is observed. This is due to hydrolyzed ASA. Corrective action taken was:
    - o Dosing pumps interlocked

PARAMETERS FOR TROUBLE FREE ASA SIZING

Particulars	Unit	Range
Machine Conditions:		
FPR	%	87-88
FPAR	%	58-60
HEAD BOX Cationic Demand	gm/L	25-40
pH		6-6.5
Alkalinity	ppm	50-100
Paper Temperature before Size Press	°C	80-85
Consumption:		
ASA	kg/T	1.0-1.1
Fixing Agent at cc accept	gm/T	50-100
Fixing Agent at machine chest	gm/T	100-150
Retention Aid	gm/T	10-12
Alum	kg/T	3.5-4.0
Emulsion Parameters:		
Particle size	m	0.7-1.0
ASA:Cationic Starch ratio		1:2
pH of emulsion		3.8-4.2

with m/c stock pump.

- o If m/c is shut for more than 30 mins, the supply line is flushed properly.
- o If m/c system, felt, dandy, etc are cleaned with caustic, precaution is taken at startup to add excess alum.

11. On machine sizing development was poor when the pH was above or below the range 4.5-7.0. Best sizing results were found in the range 6.0-6.5.
12. Fugitive Sizing is mainly due to excessive ASA in the sheet, which gets hydrolyzed upon reacting with moisture later and destroys even the existing sizing of paper. ASA dose was minimized as far as possible.
13. PCC and GCC have a higher surface area therefore the demand for ASA is more in papers filled with them. Similarly higher ash% in paper requires more ASA to give the same Cobb value.
14. Use of de-foamers was stopped and it reduced the Cobb value and increased the consumption of ASA.
15. Monitoring of parameters of Emulsification started, as given in the coming text.

ASA Emulsification Process & Parameters

Fresh Water

Fresh water taken from fresh water pump and stored in 2 m^3 FRP tank. Initial pH is 6.5-7.0, which is adjusted to 4-5 by using Adipic Acid.

Adipic Acid solution is made by taking 10 lit hot water and mixing with 2 kg Adipic Acid. This is made upto 100 lits in drum. 4 lits per batch i.e ~ 80gm/batch is used. Operating range: 4 6 lit/batch.

Emulsifying Agent

Supplied in 120 kg HDPE drums. It is diluted to 1:1 ratio using fresh water and pH is adjusted by using Adipic Acid from 8.0 -9.5. Then this 240 liter batch is transferred to Preparation tank and agitated for 20 mins.
Adipic Acid solution is made by taking 10 lit hot water and mixing with 1-1.5 kg Adipic Acid. This is added to the above 240 liter batch.

Oily ASA

Supplied in 200 kg SS Drums from suppliers and directly transferred to Service Tank by using barrel pump.

Running Parameters for Emulsification

a) Starch and ASA ratio……..…........................…2:1
b) Primary water flow………...…………………...…….4.0-4.8 lpm
c) Secondary water flow…………………………………….55-58 lpm
d) Turbine outlet pressure………………………………… 14-15 bar
e) Recirculation pressure…..………………………………. 2-3 bar
f) Water pH…………..…………………………….…… 4-5
g) Starch pH………...…………………………………… 8-8.5
h) ASA emulsion pH……………………………………………3-4
i) Average concentration of ASA supplied……………..10-11 gpl
j) B/w pH…..............…………………………..6 -7 (ideal 6.4 -6.6)
k) Alum dose (in emulsion).…....……………… 1-3 lpm (0.5-1.5 kg/T)
l) Alum dose (backwater)..............................4-5 lpm (3 - 4.5 kg/T)

PolyBond Prepn

Take 1 m^3 of fresh water in Service Tank and add 25 kgs of PolyBond. Start agitator for 5 mins. Take 500 Liter water and 12.5 kg PolyBond

1st cc	50-100gm/t (20 to 30lph)
Machine chest	100-150gm/t (40 to 100lph)

System Cleaning:

ASA S/Tank lines : Weekly twice by taking bypass line
Retn aid tank &line : Weekly once bypass line
Fix tank and lines : Twice a month

Filter Cleaning:

Water twice/shift
Starch twice/shift
ASA emulsion once/2hr (each machine)
Retn. Aid twice/shift (each machine)

Chemical dosage during machine start up (System not drained)

The chemical dose to be maintained when machine is restarted after a long shut, system not drained during the shut .

ASA dose --- 1.2 -1.4 kg/t (0.2 -0.3 kg/t more than the running dose
Alum dose --- 1 2 lit/mint more than running dose

This dose to be maintained until the sizing is achieved .

When machine is shut for less than ½ hr

Shut all the chemical dosing and flush the ASA line well with water when machine is shut for more than one hour. Flush the ASA, Retn aid & Fixing agent lines with caustic water well .

Observation

- Based on the above experience we converted all the MF machines papers to ASA sized adopting the same guidelines in successfully running ASA. PM 1 Coating Base and Board was converted to ASA Sizing in Dec 2006, and PM 4 in July 2007.
- However, since ASA Sizing is very sensitive by nature, and responds to a wide parameter range, systematic monitoring of established parameters are required.
- Though optimization of most parameters depend on the type of machine, its configuration and current settings, some parameters which may be applicable universally are given in this article, which we believe are desirable for successfully running ASA sizing, as we do.

CONCLUSION

- Overall quality of paper improved :
  - o Brightness increased by 1.5 2.0%
  - o Fluff generation reduced.
  - o Surface strength improved.
- Productivity increased in all machines due to on machine sizing.
- Productivity of Wills Cutter improved due to non-slipperiness of ASA sized paper.