

Improving Paper Quality with Size Press Additives : Few Case Studies

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ABSTRACT

The physico-chemical characteristics of one novel size press additive are given. The product is applied in various paper mills based on agro-residue, recycled fibre, bamboo and wood as raw material and enhancement in mechanical and surface properties as well as in printability has been claimed. The details of the case studies made are described.

INTRODUCTION

The global situations are fast changing with respect to industrial growth. The environmental concerns all over the world are more dominant and are putting pressure on industries to adopt environmental friendly technologies. The demand for paper and paperboard is increasing fast and to meet the demand, industries are increasing their capacities by either modifying the existing mills or putting new mills. This has created a situation where industries have no option than going for an alternate source of raw materials. In this situation, wastepaper and agricultural residue have become obvious choices on account of low cost and no need for deforestation.

In view of increasing cost of waste paper and reduced availability of pulp in India it makes more sense that wood based pulp be significantly replaced with the other type of pulps so as to meet industry requirements. However, inherent problems of strength with use of pulps derived from these sources are significant and to overcome this problem, substantial research has been done and a series of additives to improve strength properties have been developed. Presented herewith is a small area of this research wherein size press additives substantially help to improve strength and surface properties of paper. Further in a liberalized market where top quality imported paper has found inroads; it is imperative for local industries to pull up its socks and meet market demands. In such a changing market scenario, the market forces govern sales and hence option of increasing price may not exist. The only way of growth and value addition depends on:

1. Reducing input costs through substitution of high

cost pulp/fibre with lower cost pulp formulations and reduced cost/consumption of chemicals/other RM's.

2. Entering higher end market by manufacturing paper products which offer higher value addition viz. copier paper, SS Maplitho, Graphics, Superfine, Writing-Printing and/or any high strength paper/board.
3. Reducing unit cost of production. Many units are trying their best to reduce cost of production but this exercise at many mills has reached point of saturation. With increase in labour, power, freight cost, the scope remains limited. Economics of scale do help reduce above significantly.

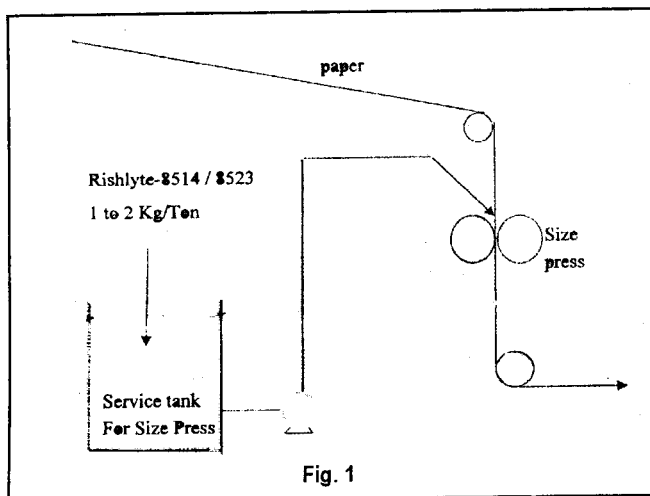
While a range of products to improve strength properties of paper have been developed, this presentation limits its scope to those size press additives which improve strength and surface properties viz. Stiffness, Wax Pick, Printability, Smoothness, Bulk etc. The input cost has also been targeted with these additives through reduction in chemical/other additives and possibility of changed furnish resulting in lower cost. Also an opportunity to manufacture higher end product with the use of such additives is now offered.

Product - size press additives

These Size Press Additives have been specially designed and formulated with cross-linked polymers which are as such inert and do not affect the working or efficiency of other additives and chemicals used in the process. The indicative molecular structure (as permitted to be disclosed) is shown below:

These products have been designed so as to ensure:

1. Easy solubility



Caution

It is extremely important while evaluating Size Press Additive to ensure that:

1. They do not affect paper quality adversely in terms of surface properties
2. They are non-corrosive and do not cause damage to Size Press.
3. Does not react with size press solution
4. They are non-toxic.

Dosage and application

To ensure ease of use by the industry, it was essential that these products be used in existing systems and have been designed to be added directly to the size press solution as such without any dilution. This will help in reduction of starch and possible subsequent reduction in cost. The other salient features of the product are that

2. Good flowability
3. Improved solid content so as to minimize transportation cost on account of water.

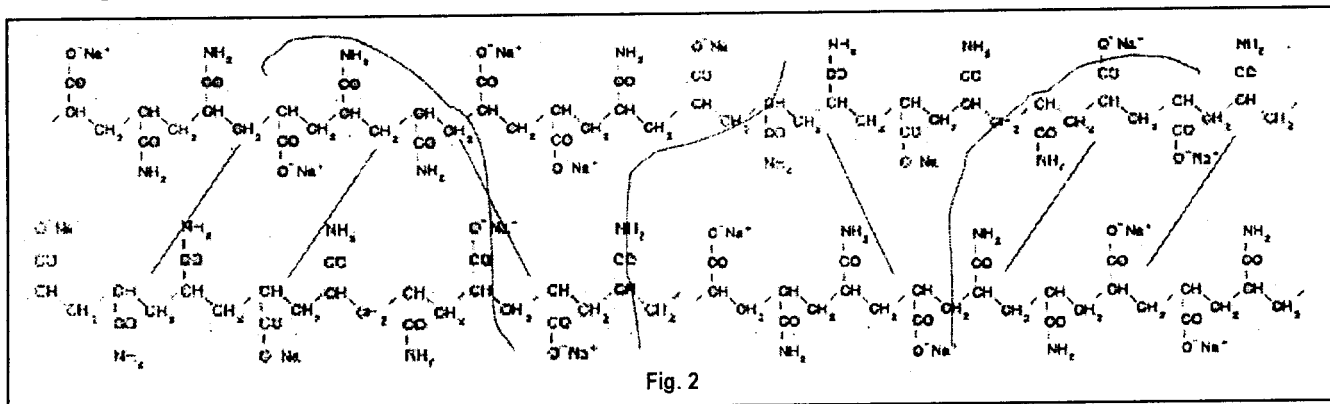


Table 1

	GSM	Smoothness TS/BS ml./min.	Stiffness MD/CD gm/cm.	Wax Pick F/B	Ash %	Bulk cc/gm
Without Rishlyte	55	200/300 120/210	0.9/0.5	12/12	11.6	1.33
	56.5	200/300 120/210	0.9/0.5	12/12	12.8	1.34
	56	210/320 110/200	0.9/0.4	12/12	11.8	1.34
With Reishlyte	55	220/320 140/200	1.0/0.6	12/12	11.8	1.35
	56	220/310 120/220	1.1/0.6	12/12	12.0	1.36
	56.5	240/320 140/220	1.1/0.5	12/12	12.2	1.35

Other strength properties were normal.
Note: One batch of size solution runs for 1.30 hrs. while MC draw was 6.6 mt/hr.

no requirement of cooking exists and product is very easily mixed with starch solution. Dosage varies from 1 to 2 kg per tonne depending on base paper quality, the desired strength properties and fibre structure of paper. The product would need to be modified in some cases depending on fibre structure of paper so as to ensure proper impregnation and desired results. The product being non-toxic can be used for manufacture of food grade papers/boards. A schematic of the application can be seen as under:

Case studies

The case studies attached herewith show the performance of these size press additives on the following furnish types:

- a) Bagasse
- b) Rice straw
- c) Waste Paper
- d) Bamboo
- e) Hardwood

The following paper qualities have been manufactured with these additives

- a) Copier
- b) Writing and printing
- c) SS Maplitho
- d) Superfine
- e) Graphics
- f) Duplex Boards

Case studies presented cover the medium and large paper machines though the additives are equally effective on smaller machines as well.

Case studies

No.	1
Production Capacity	: 160 M.T. per day
Quality	: Graphic
Type of Size Press	: Inclined
Paper M/C speed	: 700 mpm
Size press Solution	: 360 Kgs starch + usual chemical (Without Rishlyte)
Size press Solution	: 360 Kgs starch + usual chemical (With Rishlyte) + 20 Kgs Rishlyte 8514

Case studies

No.	2
Production Capacity	: 200 M.T. per day
Quality	: Copier
G.S.M.	: 75
Type of size press	: inclined
Paper M/C speed	: 630 MPM
Size Press Solution	: 360 Kgs starch + usual chemical (Without Rishlyte)
Size Press Solution	: 300 Kgs starch + usual chemical (With Rishlyte) + 25 Kgs Rishlyte 8514.

Table 2

	GSM	Smoothness TS/BS ml./min.	Stiffness MD/CD gm/cm.	Wax Pick F/B	Ash %	Bulk cc/gm
Without Rishlyte	76	220/300 120/200	2.4/1.2	13/13	6.9	1.35
	77	240/300 150/210	2.5/1.3	13/13	7.0	1.34
	77	240/300 150/210	2.4/1.2	12/12	6.7	1.35
With Rishlyte	77	180/380 140/220	2.6/1.6	13/13	6.8	1.36
	76	220/310 140/220	2.7/1.7	13/13	6.9	1.36
	77	220/300 120/180	2.7/1.6	13/13	6.8	1.35

Other strength properties were normal.

Note: One batch of size solution runs for 1.30 hrs. while M/C draw was 8.2 mt/hr.

Case studies

- No. 3
- Production Capacity : 50 M.T. per day
- Quality : S.S. Maplitho
- G.S.M. : 70
- Type of size press : Inclined
- Paper M/C speed : 230/240 MPM
- a) Size Press Solution: 300 Kgs starch +usual chemical
(Without Rishlyte)
- b) Size Press Solution: 300 Kgs starch + usual chemical
(With Rishlyte) + 8 Kgs Rishlyte 8514
- c) Size Press Solution: 250 Kgs starch + usual chemical
(With Rishlyte) + 8 Rishlyte 8514.

Table 3

	GSM	Smoothness	Stiffness MD/CD	Wax Pick F/B	Ash %	Bulk cc/gm
A)	70	50	80/67	8A	15	1.35
B)	70	64	92/74	8A clear	15	1.36
C)	69	62	86/70	8A clear	15.5	1.36

Other strength properties were normal.
Note: One batch of size solution runs for 4 hrs. while M/C draw was 2.0 mt/hr.

Case studies

- No. 4
- Production Capacity : 40 M.T. per day
- Quality : Duplex Board
- G.S.M. : 296
- Type of size press : Inclined
- Paper M/C speed : 230/240 MPM
- Size Press Solution : starch +usual chemical
(Without Rishlyte)
- Size Press Solution : starch + usual chemical
(With Rishlyte) + 2 Kgs Rishlyte 8514

Case studies

- No. 5
- Production Capacity : 60 M.T. per day
- Quality : Duplex Board
- G.S.M. : 340
- Type of size press : Inclined

Table 4

	GSM	Stiffness MD/CD
Without Rishlyte	300	90/45
	298	83/39
With Rishlyte	300	97/48
	297	97/47
	302	94/41

Other strength properties were normal.

- Size Press Solution : Starch +usual chemical
(Without Rishlyte)
- Size Press Solution : Starch + usual chemical
(With Rishlyte) + 2 Kgs Rishlyte 8514

Table 5

	GSM	Stiffness MD/CD	Smoothness TS/WS
Without Rishlyte	344	170/80	70/35
	342	180/85	75/40
With Rishlyte	342	190/90	80/45
	340	180/85	75/40

Other strength properties were normal.

Case studies

- No. 6
- Production Capacity : 60 M.T. per day
- Quality : Writing-Printing Paper
- G.S.M. : 56-60
- Type of size press : Inclined
- Size Press Solution : 25 Kgs starch +usual chemical
(Without Rishlyte)
- Size Press Solution : 16.7 Kgs starch + usual chemical
(With Rishlyte) + 1.2 Kg Rishlyte 8523
- Note: 11% improvement observed in stiffness.

CONCLUSION

According to the results obtained, the improvements observed are 10-15% increase in stiffness and substantial increase in wax pick value, smoothness and printable property. It is also possible to bring down starch consumption and raw material costs through use of well designed and effective of these novel Size Press additives.