

Modern Trends in Rosin Sizing : For Reduction in Alum Consumption, Corrosion and Effluents

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Sizing of paper is essential to render the sheet more resistant to penetration by liquids, particularly water.

Amongst the various materials used as sizing agents, rosin is most commonly used in our country. Usually rosin size is in the form of a thick paste containing 70-80% solids. This paste is diluted to about 3% solids with hot water with vigorous agitation. This solution is added to the stock about 1.5 - 3% size based on dry fiber, depending upon the supply water hardness, degree of sizing required and the pulp furnish. At this stage aluminium sulfate, about 3-7 times the weight of rosin size is added. This precipitates the rosin on the fibers as flocculated particles to produce the desired sizing. The pH after the addition of alum is around between 4.5 to 5.5. In India, usually 3% rosin size and 6-7% alum based on dry paper are used.

In most of the paper mills in the developed countries, High-Free-Rosin-Emulsion Sizes are used to size all grades of paper that are made under acidic pH. These sizes offer the following advantages :

Immediate Gains of Using Rosin Emulsion Size

- (1) As the size is in the form of a stable emulsion (containing 30-35% rosin), instant dilution is possible affording considerable savings in energy and time.
- (2) Amount of Rosin required in the form of Emulsion Size per Tonne of paper is less than one third the

conventional rosin size. However, as the Emulsion Size has only 30-35% of rosin the requirement would be about 6 to 12 kg as *Emulsion Size* per MT of paper (Table-I).

(3) The real financial benefits come from the substantial reduction in the alum required. This can be as little as 20% of that required for ordinary rosin size for the same degree of sizing.

The following examples would explain better:

A paper mill in India producing 100 T paper per day would require 20 kg ordinary rosin size and at least 50 kg of alum per Tonne of paper. On the other hand, by switching over, it would need 20 kg of Rosin Emulsion size and only 16 kg alum per T of paper. Or a Saving of 34 kg alum per Tonne. At Rs. 1.50 per kg alum, this Saving alone would amount to Rs. 51/- per T equivalent to Rs. 5100/- per day (for 100 T production), that is a saving of Rs. 15,30,000/- annually (Table-II).

Let us consider another example: Some of the smaller paper mills (capacity 15-25 T per day) use about 1% rosin and 7 to 7.5% alum on paper to obtain a Cobb value of 19-20. By using 1% rosin emulsion size and 3% alum on paper, the same Cobb value can be achieved. Thus, giving tremendous financial advantages without any additional investment.

Table-I
Comparison of Rosin Based Sizing Agents

Sizing Material	Actual Rosin required, kg/T of Paper	Alum required, Kg/ T of Paper
Ordinary rosin size	15-20	33-45
Fortified rosin size	5-7.5	12-18
Rosin Emulsion size	2-4	4-59

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Table-II
Monetary Benefits in Using Rosin Emulsion Size

Material	Amt. used per T/paper by old process	Amt. used per T/paper by new process	Saving per T/paper Rs. 1/50 per kg alum	Minimum Saving per 1000 T paper
Ordinary Rosin Size	20 Kg	—	—	—
Rosin Emulsion Size	—	20 Kg	—	—
Alum	50 Kg	16 Kg	34 Kg = Rs. 51/-	Rs. 51,000/-

Long Term Benefits of Using Rosin Emulsion Size

1. Improved Profitability	— Greater Productivity (Upto 10%) (More Saleable Paper per unit time).
2. Better Machine Operability	— Cleaner Wet End (Fewer Deposits) — Easier Drying — Stronger Web
3. Higher Quality Paper	— Increased Strength (Upto 15%) — Greater Performance due to Reduced Acidity. — Better Printability (Less Linting). — Reduced Off Grades
4. Less Corrosion	— Low Alum System (Higher Operating pH) leads to Reduced corrosion on Refining Equipment, Drier Surfaces and Calender Rolls. Additionally it Increases the Wire Life.
5. Effluents Reduction	— All the excess Alum used during the sizing operation ends up as aluminium hydroxide precipitate which is the principal source of wet end deposits. It also contributes to the decreased wire life. By using Rosin Emulsion Size, and Low Alum System (Higher pH), lesser corrosion and lower effluent loads result.

Based on research results, one leading industrialist is putting up a plant for the manufacture of Rosin Emulsion Size in India. Very soon this material would be available for the benefit of our paper industry.

In conclusion, I can say that by switching over to Rosin Emulsion Size the following advantages can be achieved :

- 1] Lower rosin and alum consumption.
- 2] Reduced corrosion on all mechanical equipment from beater onwards.
- 3] Much reduced wet-end deposits resulting in lower effluent loads.