



Coated bleached board mill eliminates sheet spots and reduces basis weight variability with a NALCO Water water-base defoamer program



CASE STUDY - PAPER

CH-575



Mill Overview

Grade:	Coated bleached board AKD or rosin sized depending on pH
Key Drivers:	Sheet quality improvements Improved process efficiency
Challenge/Opportunity:	Eliminate sheet spots Eliminate machine deposits Eliminate basis weight variation
Machine Type:	Fourdrinier with BelBond
Machine Speed:	700-1500 fpm
Tons per Day:	600 tpd
Furnish Mix:	100% sawdust/pine chip
System pH:	5.8-7.0
Headbox Temperature:	57°C (135°F)
Program:	NALCO Water water-base deaeration and monitoring program

BUSINESS SITUATION

A producer of 2-ply coated bleached board needed to improve sheet quality and reduce downgrade culled paper on their Fourdrinier machine with a BelBond top former. Discussions with the customer indicated that the mill was facing increased pressure from end-use customers to eliminate spots in the finished sheet that lead to bleed through and poor finished print quality. In addition to improving sheet quality, the mill was also faced with numerous foil and wire deposits that impeded drainage and increased machine wire wear. Brittle wire and foil deposits were identified as one potential cause of increased wire losses and subsequent decreases in machine productivity.

Based on input from the customer, NALCO Water conducted a complete audit of the paper machine wet-end. Included in this audit were analyses of sheet spots and the tacky deposits found in stock chests and on the surface of machine foils and wires. Analytical results indicated that the primary component of these contaminants was polyethylene glycol (PEG) ester, a primary ingredient of the mill's paper machine defoamer program. By evaluating the performance of the PEG ester across the machine's grade structure, it was determined that this defoamer chemistry ran well when machine temperatures approached 57°C (135°F). Solubility of some components of the PEG ester defoamer decreased

significantly when temperatures approached 49°C (120°F), the low end of the machine operating range. Heavy deposition was the result. The competitor's efforts to apply alternative PEG ester chemistries that were more soluble at lower temperatures had resulted in negative impacts on the mill's rosin size program.

As part of its wet end audit, NALCO Water worked with the mill to better understand the impact that entrained air had on sheet basis weight control. It was discovered that on-line microwave consistency meters at the outlet of the blend chest and machine chest were incorrectly measuring stock consistency as a result of increased entrained air in the system. Because the on-line consistency meter at the outlet of the machine chest was tied directly to on-line basis weight control, swings in entrained air led to detrimental variations in sheet basis weight profiles.

PROGRAM DESIGN

A number of mechanical, operational, and chemical options were investigated to minimize entrained air fluctuations and to eliminate deposits and spots in the finished sheet. Critical to designing a successful solution for the mill was the replacement of the current machine defoamer with a program that was more stable at headbox temperatures of 49 - 57°C (120 - 135°F). Due to past deposition problems with silicone chemistries, the mill insisted that water-base chemistries be evaluated. NALCO Water proposed a high solids, water-base defoamer program proven to



be stable at operating temperatures greater than 57°C (135°F). The product was applied to the seal pit via the seal pit shower at 0.5 #/ton and to the stuff box at 0.5 #/ton with Pulsatron pumps. It should be noted that the NALCO Water defoamer did not require dilution or "micronization" because it is pre-emulsified to a 3 micron or smaller particle size and, therefore, does not require additional dilution or shear to enhance performance.

ANALYSIS OF BUSINESS SITUATION

Key Drivers

- Sheet quality improvements
- Improved process efficiency

Challenge/Opportunity

- Eliminate sheet spots
- Eliminate machine deposits
- Eliminate basis weight variation

KEY PERFORMANCE INDICATORS

Prior to chemical evaluations, NALCO Water worked with the mill to establish Key Performance Indicators (KPIs) for the trial. These KPI's included:

- Elimination of defoamer related spots in the finished sheet as measured by an on-line spot

counter and manual spot checks

- Visual elimination of foil and wire deposits
- Reduced variability of entrained air at on-line consistency meters
- Reduced deviation in basis weight profile
- Improved drainage as a result of better entrained air control
- Cost performance of the program

PROGRAM RESULTS

Upon introduction of the NALCO Water defoamer program, entrained air at the stuff box fell from 1.8% to 0.8%. This entrained air reduction translated into a drainage increase that allowed a 3407 liter (900 gallon) per minute increase in headbox dilution. This increase in headbox dilution resulted in improved sheet formation, smoothness and coatability of the finished sheet. By reducing the level of entrained air at the machine chest, fluctuations in on-line entrained air readings were minimized. A reduction in basis weight profile variation was the result. In addition, all on-machine deposits and sheet spots were eliminated.

CONCLUSION

A complete mechanical, operational, and chemical audit at a coated bleached board manufacturer led to improved sheet quality and the elimination of deposits and basis weight variation with the redesign of the mill's paper machine defoamer program. By replacing the competition's machine defoamer with a high performance stock deaeration and drainage chemistry, NALCO Water was able to achieve these significant and quantifiable results. A total solutions approach resulted in improved process control and better finished sheet quality.

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