High Performance Linerboard & Medium Mill Incorporates Core Shell™ 61067 Technology and POSITEK™ 4G 9000 Technology Through PARETO™ Mixing Technology

Increased Production and Improved Wet – End Stability, Water Savings of More than 80,000 gallons/day

NALCO Water
An Ecolab Company

CASE STUDY – PAPER
CH-1064

MILL OVERVIEW:

Grade:	Linerboard and Corrugated Medium
Basis Weight Produced:	23 to 45#/1000ft^2
Machine Type:	Two Ply Fourdrinier (70:30)
Press Type:	1st Straight through, 2nd LNP
Production Rate:	72 tph
Machine Speed:	2000 – 3000 fpm
Furnish:	100% Recycle
Wet-end Chemistry:	Core Shell 61067 technology, POSITEK 4G 9000 technology, Thin & Thick Stock Starch, ASA, Alum
pH:	6.8

ENVIRONMENTAL INDICATORS	eROI℠	ECONOMIC RESULTS
Increased production by 1.5%	ASSETS	Increased production resulted in $770,000 additional profit per year
Saved > 80,000 gallons/day	WATER	Saved $9,200/year
Saved >15 MM BTU/day	ENERGY	Saved $91,000/year
Reduced Core Shell 61067 technology usage by 200,000 lbs./year and reduced Nalco Water 7543 technology usage by 70,000 lb#/year	EARTH	Saved $275,000/year
Reduced >7,700 lb/year of VOC's (volatile organic compounds)	AIR	Operating well within VOC regulatory limits

eROI is our exponential value: the combined outcomes of improved performance, operational efficiency and sustainable impact delivered through our services and programs.

ANALYSIS OF BUSINESS SITUATION

Key Business Drivers

- Improve uptime
- Produce HPL grades at or below nominal BW
- Reduce chemical usage and overall chemical cost
- Reduce fresh water and energy cost
- Increase productivity

Challenge/Opportunity

- Run to the design specification of 0.6% solids on the base ply headbox, which is 20% lower than the historical average
- Eliminate table drainage as a bottle neck to production
- Optimize drainage under varying process conditions (i.e. high refining HPD/T)
- Reduce chemical consumption
- Reduce paper breaks due to poor mixing when feeding RDF chemistry post screen

BUSINESS SITUATION

A recycle Linerboard and Corrugated Medium Mill wanted to capture the benefits of running Retention, Drainage, Formation (RDF) chemistry post screen. These benefits include chemical efficiency, drainage, production and process reliability. In the past, post screen RDF chemistry created variability in the process due to poor mixing. The end result was paper machine breaks.

In an effort to assist the mill with their key business drivers, Nalco Water proposed installing PARETO Mixing technology post screen on the base ply for both the Core Shell 61067 technology and POSITEK 4G 9000 technology, retention and drainage aids. In addition to the aforementioned benefits of running RDF chemistry post screen, PARETO Mixing technology also allowed use of filtered white water for secondary chemical dilution. The net result is improved drainage, reduced freshwater usage and energy savings from not heating cold water.

BACKGROUND

At this customer site, Core Shell 61067 technology is used to control fiber retention on both the base and top ply. The customer attempted to feed Core Shell 61067 technology post screen on the base ply through a drilled quill and prescreen on the top ply. Performance was variable while feeding through the quill and caused machine runnability issues. The following is an assessment of the existing chemistry program before implementing PARETO Mixing technology:

- Core Shell technology moved prescreen, which resulted in an increase in chemical usage to maintain fiber retention
- POSITEK 4G 9000 technology prescreen on base ply through a drilled quill.
  - Provides drainage control on fourdrinier, but results are variable due to poor mixing and channeling ahead of two selectifier screens.
  - Drainage response inconsistent at high feed rates of POSITEK 4G 9000 technology, 1.5 #/ton or greater
  - Forward POSITEK 4G 9000 technology addition provides the best drainage response
- Fresh water used for secondary dilution of POSITEK 4G 9000 technology
- Filtered whitewater used for secondary dilution of Core Shell 61067 technology

PROGRAM DESIGN

Prior to the installation of PARETO Mixing technology, a Nalco Water Industry Technical Consultant performed a complete assessment of the approach piping, unit operations within the approach system, and best known chemical feed strategy to ensure desired results were attainable. The installation of PARETO Mixing technology was completed in two steps, first the POSITEK 4G 9000 technology and then Core Shell 61067 technology. This approach was used to allow Nalco Water and the customer to quantify the benefits of PARETO Mixing technology from both water and energy savings and improved Silica performance.

After achieving success with the POSITEK 4G 9000 technology PARETO Mixing technology system the objective was to move forward with the installation of the Core Shell 61067 PARETO Mixing technology program.

KEY PERFORMANCE INDICATORS

- Production rate
- Core Shell 61067 technology usage
- Base headbox flow
- Flatbox vacuum – primary indication of wet-end stability
- Increased stock freeness from before to after retention aid and POSITEK 4G 9000 technology addition
- Reduced process variability on all grades from run-to-run

PROGRAM RESULTS (ANALYSIS COMPLETED ON 35# HPL)

- 24% reduction in Core Shell 61067 technology dosage without loss in tray solids, 0.11% (Figure 1).
- Production increase of 1.4% or 1.0 TPH (Figure 2).
- Operating at design specifications of base headbox
  - Increased headbox flow by 22%, 4700 gpm
  - 100% accredited to feeding POSITEK 4G 9000 technology through PARETO mixing technology post screen and was realized prior to moving

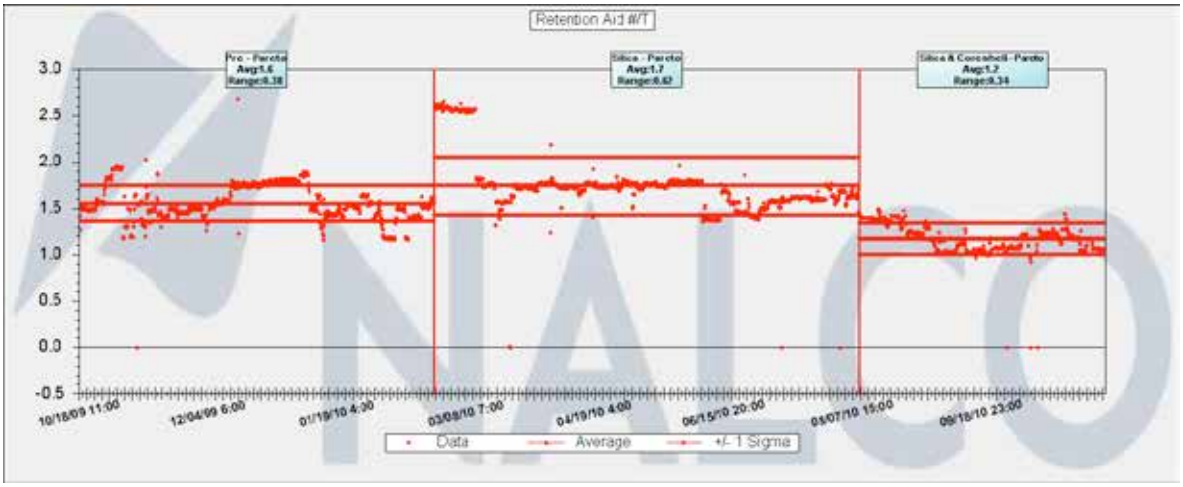

Figure 1 – *24% reduction in Core Shell 61067 technology dosage without loss in tray solids, 0.11%.*

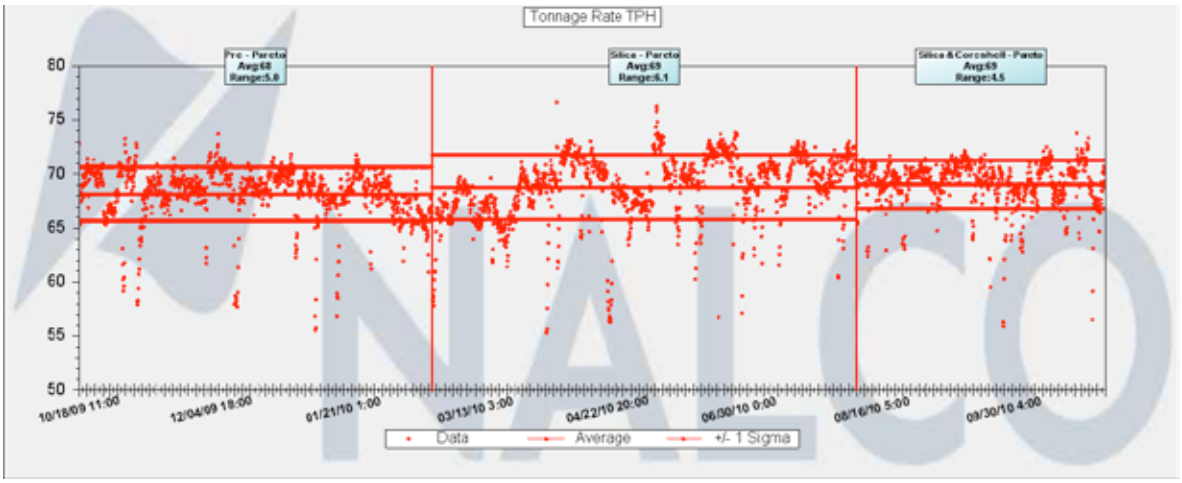

FIGURE 2 - *Production increase of 1.4% or 1.0 TPH*

Core Shell 61067 technology post-screen through PARETO technology. Gains were not lost when Core Shell 61067 technology was moved post screen. (Figure 3)

- 8% reduction in Base ply ASA usage with a 26% improvement in coefficient of variation (Figure 4) meets key business driver (chemical cost reduction)
- 32% coefficient of variation improvement in Flatbox vacuum (Figure 5)
- 13% coefficient of variation improvement in Ring Crush/# Basis Weight
- 28% coefficient of variation improvement in couch vacuum 21% reduction in anti-skid usage.
- The combination of Core Shell 61067 technology and POSITEK 4G 9000 technology post screen has provided a 100-150 ml increase in CSF from pre-screen to headbox
- Fresh water reduction of 28,000,000 gallons per year. Energy reduction associated with heating fresh water, >15 Billion BTU's per year.
- Water and energy savings of $100,000/yr.

CONCLUSIONS

PARETO Mixing technology has allowed this papermaker to effectively feed RDF chemistry post-screen and achieve remarkable improvements in process stability from one production run to the next, which has improved the mill's ability to consistently meet their key business drivers. This is an excellent case of properly engineering, installing, and tracking the value associated with PARETO Mixing technology.

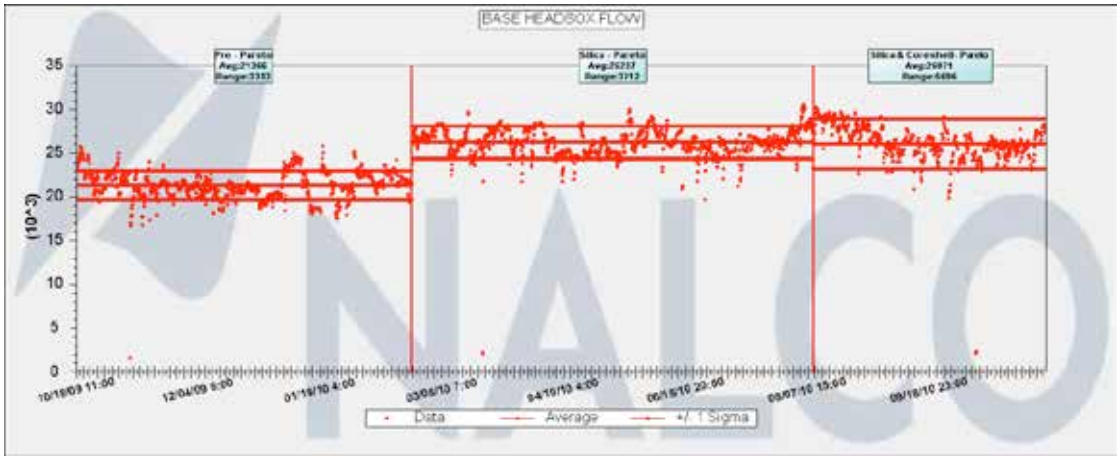

Figure 3 – *Increased headbox flow by 22%, 4700 gpm.*

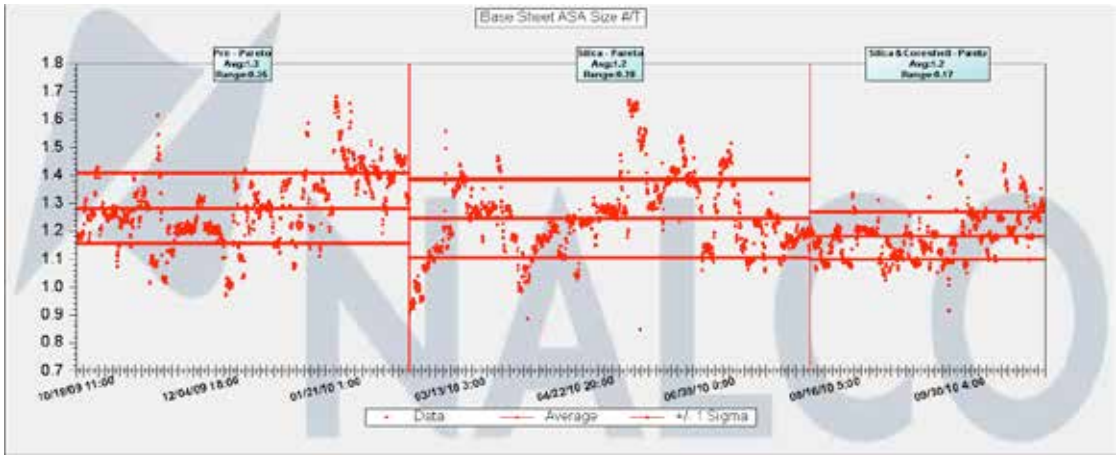

Figure 4 – *8% reduction in Base ply ASA usage with a 26% improvement in coefficient of variation.*

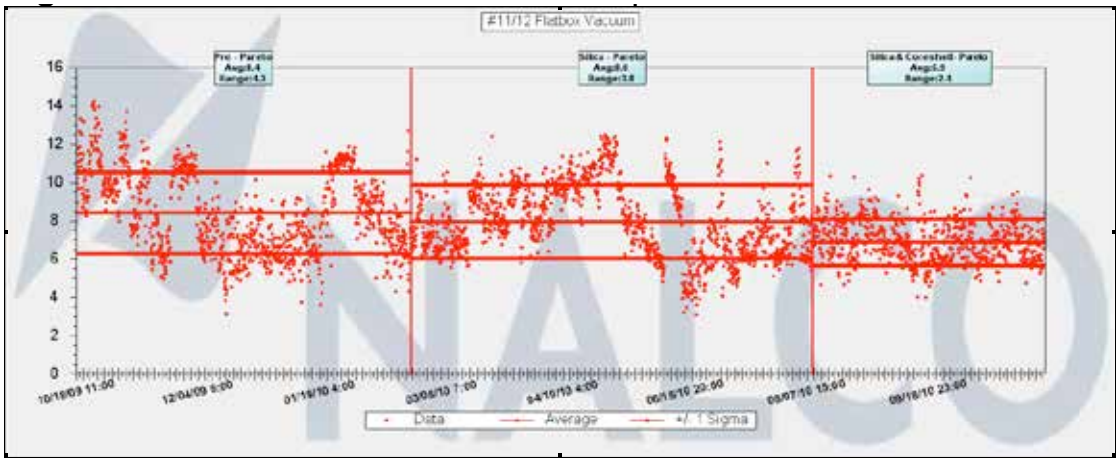

Figure 5 – *32% coefficient of variation improvement in Flatbox vacuum.*

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