

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

CASE STUDY

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

► MILL OVERVIEW

- Grade: Linerboard and Corrugated Medium
- Basis Weight Produced: 23 to 45#/1000ft²
- 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

► 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.



ANNUAL SAVINGS



PRODUCTIVITY

\$770,000 Annually

Increased production by 1.5%



ENERGY

\$91,000 Annually

Saved >15 MM BTU/day



WATER

\$9200 Annually

Saved >80,000 gallons/day



RAW MATERIAL OPTIMIZATION

\$275,000 Annually

Reduced Core Shell 61067 technology usage by 200,000 lb/year and reduced Nalco Water 7543 technology usage by 70,000 lb/year



TOTAL VALUE DELIVERED

\$1,145,200 Annually

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

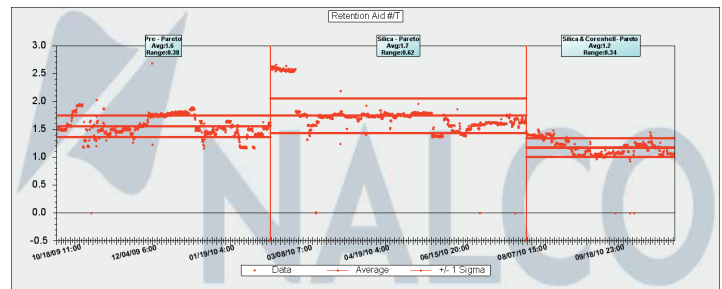


FIGURE 1: 24% reduction in Core Shell 61067 technology dosage without loss in tray solids, 0.11%

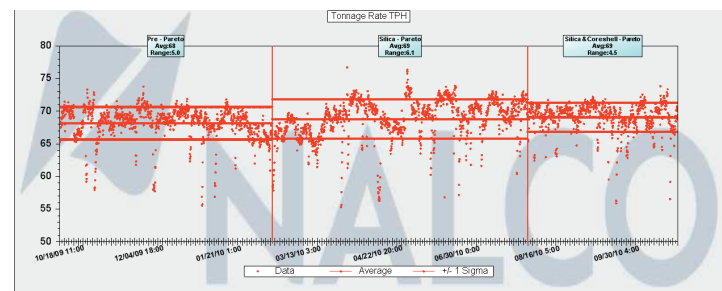


FIGURE 2: Production increase of 1.4% or 1.0 TPH

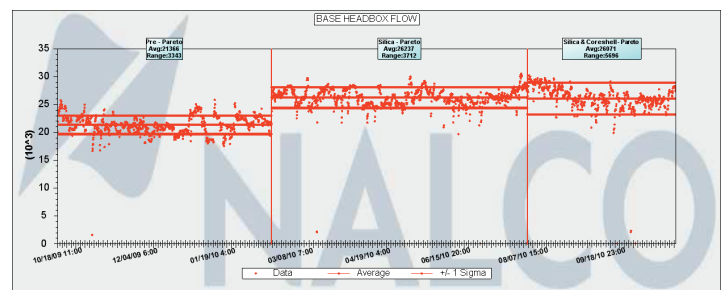


FIGURE 3: Increased headbox flow by 22%, 4700 gpm.

- 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

CONCLUSION

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.

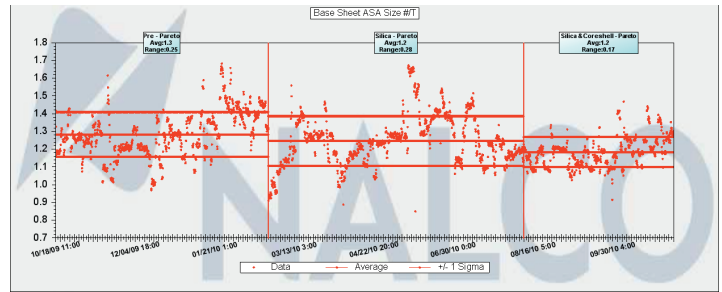


FIGURE 4: 8% reduction in Base ply ASA usage with a 26% improvement in coefficient of variation.

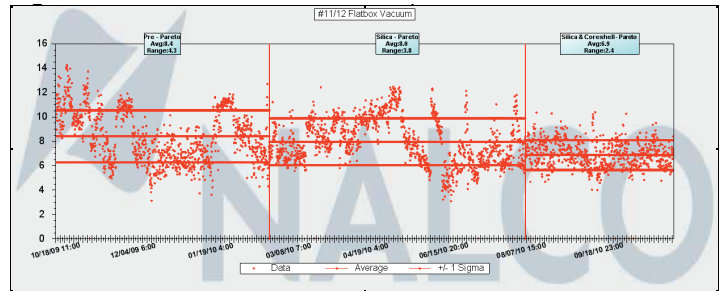


FIGURE 5: 32% coefficient of variation improvement in Flatbox vacuum.