Managing Machine Deposits to Improve Machine Efficiency

*OxiPRO™ Deposit Control Technology*

**BUSINESS SITUATION**

The mill had been running an oxidant and proprietary biocide program for the past four years. The mill was experiencing good overall runnability along with sporadic hole issues coming from the forming area requiring downtime and wash-ups.

Nalco successfully implemented its OxiPRO Deposit Control Technology on two LWC paper machines at this customer site. The technology application integrates monitoring, chemistry, and on-site expertise to improve machine performance. This program has allowed the customer to reduce holes originating in the former area and eliminate wash-ups due to these holes on one machine. The second machine has been able to reduce the frequency of boilouts while being able to run a triple layer wire with no increase in former holes as observed in the past.

**BACKGROUND**

Nalco has had a long partnership with this customer. And as a result, the biocontrol program has evolved continuously over time to improve efficiency issues, including those related to microbial deposits. When the OxiPRO Deposit Control Technology monitoring program was first implemented, the biocontrol program was comprised of a proprietary biocide and high dosages of sodium hypochlorite. Biocontrol was perceived to be satisfactory.

This program had positive results, but still was susceptible to microbio outbreaks as well as fourdrinier deposits. The deposits resulted in holes requiring unscheduled wash-ups, costing 2-4 hours of downtime for each wash-up. One machine was washing up once every 2-3 weeks to gain relief from these holes.
ANALYSIS OF BUSINESS SITUATION

Key Business Drivers

• Improve On-Machine Efficiency (OME)
• Reduce wet-end and former related holes
• Need to reduce or eliminate wash-up frequency between shut downs

Challenge/Opportunity

• Eliminate or reduce deposition on machines contributing to holes and breaks requiring wash-ups between outages.
• Opportunity to reduce the amount of oxidant used when compared to the previous program improving corrosion potential.
• Running a stabilized oxidant successfully in an peroxide rich environment.
• Run a triple layer wire without experiencing the level of former holes experienced on past triple layer wire trials.
• Because machine efficiencies were already running at a high level, the challenge would be to determine if instituting a stabilized oxidant program could deliver increased OME over the current program.

PROGRAM DESIGN

Nalco proposed OxiPRO Deposit Control Technology programs integrating new proprietary on-line monitors, new stabilized-chlorine chemistry, and on-site expertise to address the specific needs of this customer. The chemical component of the deposit control program used NALCON™ 60615 to stabilize chlorine.

The OxiPRO technology program incorporated a customized feed station allowing Nalco to safely feed two machines continuously from a central location (Figure 1).

In addition, Nalco’s on-line monitors would be installed and utilized to monitor and evaluate the program efficacy.

PROGRAM RESULTS

OxiPRO Deposit Control Technology allowed this customer to successfully reduce hypochlorite usage rates by 75%, while improving the effectiveness of the microbiological control program. Figure 2 illustrates the impact of the new program on aerobic bacterial counts for both machines.

Proactive Monitoring: The OxiPRO Biomonitor and Activity Monitor were used to determine pre-trial fouling tendencies and microbiological activity and the impact of transitioning to Nalco’s OxiPRO technology program. Figures 3 and 4 illustrate the real-time data that is collected and available locally or on-line.

Microbial activity was extremely high when the traditional oxidant program was utilized. This is indicated by the large change between the maximum and minimum activity values in Figure 3. Following implementation of the stabilized halogen program, the difference between the maximum and minimum activity index values is greatly reduced, indicating improved control of microbial activity as seen in Figure 4.

KEY PERFORMANCE INDICATORS

<table>
<thead>
<tr>
<th>KPI</th>
<th>Measure(s)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>On-Machine Efficiency (OME)</td>
<td>• Boil-outs per year • OME</td>
<td>One machine eliminated one scheduled boilout with no negative impact on holes or runnability. Equal or improved OME performance.</td>
</tr>
<tr>
<td>Former Holes</td>
<td>• Number and frequency</td>
<td>PM #1-70% reduction in former holes on triple layer wire. PM #2-Eliminated former holes requiring wash-up.</td>
</tr>
<tr>
<td>Downtime due to wash-ups</td>
<td>• Wet end wash-ups caused by Former holes (2-4 hours)</td>
<td>Historical wash-up every 2-3 weeks. Mill targeted 6 weeks between outages without wash-ups.</td>
</tr>
</tbody>
</table>
Figure 2 – Implementation of an OxiPRO Deposit Control Technology program reduced aerobic bacterial counts in the papermaking process.

Figure 3 – During the use of the sodium hypochlorite biocontrol program, the new OxiPRO monitors measured high microbial activity, as indicated by the large difference between the maximum and minimum Activity values during the monitoring cycles (delta Activity >50). This corresponded to a dramatic reduction in oxidation-reduction potential (ORP) during the monitoring cycles.

Figure 4 – When the OxiPRO Deposit Control Technology stabilized-chlorine program was implemented, the new OxiPRO monitors measured more stable oxidation-reduction potential (ORP) conditions. This corresponded to a dramatic reduction in microbial activity, as indicated by the small difference between the maximum and minimum Activity values during the monitoring cycles (delta Activity <15).

OME Impact: The goal of improving OME was achieved for the last four months when compared to the previous 10 months of pre-trial operation.

The main objectives to decrease former holes and reduce wash-ups due to those holes were obtained. Paper Machine #1 reduced the number of fourdrinier holes by 70% while using a triple layer wire as seen in Figure 7. This enables the mill the potential to save significant dollars by extending the life of the fabrics for this machine by the wire design change. Paper Machine #2 extended time between wash-ups due to fourdrinier holes from 2 - 3 weeks up to 10 weeks.

MAINTAINING THE VALUE

Nalco and the customer will continue the process of regular machine audits and the use of proactive monitoring to ensure that gains are maintained. This process is ongoing and ensures that data related to the efficacy of the biocontrol program and machine efficiency are used to continuously optimize the products, dosages, or feed points for maximum performance.

CONCLUSION

Working with the mill personnel, Nalco was able to implement a new, proactive biocontrol strategy that reduced downtime associated to wet-end former holes. This new strategy also allowed the mill to run a triple layer wire with reduced holes and downtime. This enables the mill to reduce expenses by extending the life of the machine fabrics. Nalco continues to solidify its reputation as the partner of choice when it comes to supporting the papermaker in achieving their goals.
Machine deposits in a paper production process can influence On-Machine Efficiency (OME). OxiPRO Deposit Control Technology provides an innovative, patent-pending offering that prevents operational problems caused by such deposits. OxiPRO Deposit Control Technology provides comprehensive solutions tailored to your unique application. These solutions improve environmental performance, while impacting your bottom line. Nalco’s newest innovative patent-pending SMART Solutions offering, OxiPRO combines proactive monitoring tools, sophisticated data analysis tools, tailored programs, innovative application strategies, and application expertise. This leads to improved control of microbial growth and deposit formation, fewer sheet breaks and defects, reduced downtime, and increased machine speed. The overall result is increased OME and enhanced finished product quality.