Paper Machine Cleaning

Machine Cleanliness, Worker Safety, Improved Efficiency

NALCO Water
An Ecolab Company

PROGRAM PROFILE
PR-275

PAPER MACHINE CLEANING

NALCO Water incorporates recognized expertise in maintaining a clean machine while improving workers' safety. A clean machine is a minimum requirement for safe and efficient operation. Papermaking is a process that can quickly lead to contamination buildup on the machine, which in turn, can lead to unsatisfactory appearance and unsafe working conditions. Production losses are also a common consequence of a paper machine when contamination collects and then breaks off and falls onto the sheet or machine fabrics, creating sheet quality problems such as holes or breaks.

Machine boilouts are very effective in eliminating contamination internal to the machine. However, there are many areas of the paper machine that cannot be cleaned with a boilout. These include regions above the stock line in the headbox, the machine frame, and other misted areas of the machine and save-all. These areas will all accumulate deposits including microbial, scale, and stock residue. Dryer hoods and machine frames will also build up paper fines and microbial growth. NALCO Water Paper Machine Cleaning programs provides an economical way to maintain a safe and efficient paper machine.

BENEFITS

Foam cleaning can be very effective in these hard-to-reach areas. A concentrated layer of foam can be applied to these areas using the appropriate foaming equipment and product selection, allowing the cleaning chemical to completely wet out a deposit no matter what the surface configuration may be – horizontal, vertical, or inclined. The NALCO Water Twin-Line Foamer creates a deep, penetrating foam for fast, effective cleaning of machine frames, headbox, fabrics, stock chests, deckers, washers, and wherever tough deposits pose a risk to runnability.

THEORY

NALCO Water Paper Machine Cleaning programs for machine cleaning are designed to supply a cleaning chemical onto hard-to-reach surfaces of a paper machine. The cleaning chemical is chosen specific to the targeted contaminant, and NALCO Water has products to attack any contaminant found in a paper mill. Dosages are selected based on the contaminant and degree of build-up. NALCO Water works with the customer to establish safe, effective procedures, keeping safety as the number one priority. The cleaning product is applied using a foaming unit designed specifically for the

task. The unit is flexible so you can feed multiple chemistries and adjust the amount of foam as needed. The product then can be quickly rinsed with mill water. NALCO Water performs a post-cleaning inspection with the customer to ensure the program goals are achieved.

CLEANING TECHNOLOGY OFFERINGS

NALCO Water has several products that are used for general foam cleaning and should be chosen based on the contaminant being targeted and materials of construction of the surfaces being cleaned. These products are:

- **NALCO 2634** – A solventized, alkaline product very effective at cleaning heavy organic soils, particularly organic stickies in recycle mills.
- **NALCO 2642** – A neutral degreaser very effective in cleaning grease, oils, and coating residue.
- **NALCO 2627** – A degreasing product with no free caustic, that is safe to use on aluminum surfaces.
- **NALCO 2623** – An organic, acid-based product particularly effective in brightening aluminum and cleaning scale buildup.
- **NALCO 1570** – A strong alkaline product effective at cleaning heavy microbiological and other alkaline-soluble contaminants.

NALCO Water also offers standard equipment to be used for creating and applying the foam to machine surfaces. NALCO Water's portable Twin-Line Foamer or wall-mounted High-Foam Generator can be used to optimize the mixing of NALCO Water product and air to produce a deep, penetrating foam for fast, effective cleaning of machine frames, headboxes, fabrics, stock and white-water chests, washers, and wherever tough deposits occur.

APPLICATION

Depending on the area being cleaned, the cleaning procedure is customized. Proper product choice is critical to solubilize the targeted contaminant. In general, the procedure is as follows:

- Communicate with the mill the cleaning procedure, the hazards of the products used, and proper operation of the equipment.
- Rope off the area with appropriate tape, signage, and warning lights (if available).
- Wear proper PPE – gloves, face shield, and chemical resistant coveralls at a minimum.
- Apply the chemical through the foaming unit onto the surface(s) of interest.
- Soak.
- Rinse with water hose until all foam is gone.
- Post Cleaning inspection

CASE STUDIES

Case Study #1 – Machine Degreasing

Machine Type: 550 TPD coated bleached board machine & 900 TPD uncoated linerboard machine, 100% virgin HW/SW kraft.

Machine Cleaning Technology Implementation: This mill had serious problems with grease contamination on the machine frame and floors from machine roll lubrication and hydraulic leaks. Significant time was spent cleaning these areas during every shutdown before maintenance crews would be allowed on the machine. Safety was a major concern with the slippery surfaces around which the machine operators and maintenance crews were working.

NALCO Water's foam cleaning program involved applying NALCO 2627 (aluminum-safe) to the floors and machine frame using a foam-gun, ensuring the product coated the entire area including hard-to-reach spots. Proper safety protocols were followed including mill notification and signage, proper PPE, and personnel training in the equipment and application.

Results: The mill is very pleased with the effectiveness of the machine cleaning. The mill begins foam cleaning floors and non-process areas the day before the monthly maintenance shutdowns. Immediately after going down, the machine frame is foam cleaned before the maintenance crews are allowed on the machine. All residual grease is gone from the floors, walkways, and machine frame, allowing the maintenance to be performed safely and quickly.

This has reduced the overall down time of the shut, with faster paper machine start up and overall production increased.

Case Study #2 – Suction Rolls

Machine Type: 650 TPD coated freesheet machine, 100% virgin HW/SW kraft.

Paper Machine Cleaning Program Implementation:
The suction pick-up roll is critical for transferring the sheet from the forming fabric onto the pick-up press fabric. In a region plagued with hard water, the mill was experiencing scale build-up in the suction roll holes, decreasing the vacuum on the sheet and leading to sheet drop-offs and press fabric plugging. As a result, the machine speed was decreased to compensate and downtime due to sheet breaks was hurting the on-machine efficiency.

NALCO Water's program was designed to keep the suction roll working in optimum condition, meaning all holes open and vacuum at designed levels to accomplish sheet transfer into the press. The primary goal was to maintain maximum machine speed through the entire run between maintenance shutdowns. NALCO Water's program involved applying NALCO 2623, a safe organic acid product, in neat form to the suction roles using a Twin Line Foamer. NALCO Water worked with the mill to design proper PPE and safety protocols for foaming the machine during shutdowns. One key point is to avoid puddling the product in front of the suction roll catch pan, as this can lead to bagging and wrinkling of the pick-up felt. The product was then rinsed until the foam entirely disappeared.

Results: NALCO Water's suction roll cleaning program allowed the machine to maintain maximum speeds. The suction roll is cleaned during each maintenance shut, and sheet drop-offs and breaks at the suction roll have decreased dramatically. In total, the mill attributes an improvement of 1% in on-machine efficiency to the suction roll cleaning program. Assuming a price of $1,000 per ton for coated freesheet, this translates to increased production of over 2300 TPY and $2.3MM in added production.

Case Study #3 – Forming Section Rolls

Machine Type: 900 TPD linerboard machine, 100% recycled fiber.

Paper Machine Cleaning Program Implementation: Over time, the rolls in the forming section accumulated hot melts and stickies from the recycled furnish. The build up on the rolls would cool down during maintenance shutdowns and the forming fabric would pick the hot melts and stickies off of the rolls at start-up, embedding them into the forming fabric. This would then cause sheet defects and runnability issues. The machine personnel were crawling onto the forming fabric during shut down to clean the rolls with kerosene. The tight confinement and the breathing of the kerosene vapor was a safety concern. Downtimes also became excessive, reducing overall on-machine efficiency.

NALCO Water's foam cleaning program was designed to enable faster, safer cleanup of stickies build-up on the press rolls to eliminate sheet defects and runnability issues. The program consisted of applying NALCO 2634 using a foam gun to coat the forming fabric in a deep foam. The load on the forming fabric was reduced to help prevent transfer of the stickies to the rolls and help keep the chemical in the fabric during the wash cycle. The forming fabric was allowed to soak in the foam, then rinsed with high-pressure water. Proper PPE and operating procedures were used to maintain safety.

Results: NALCO Water's roll cleaning program saved one to four hours of down time at each startup. Assuming a price of $500 per ton for linerboard, the decreased downtime translates to increased production of over 900 TPY and $400,000 in added production. In the past, the machine personnel would have to pick the hot melts off of the forming fabric at startup. This would involve an ongoing process of crawling the forming fabric and locking the system out. NALCO Water's program not only reduced downtime, but also eliminated the need for the machine crew to crawl into the machine to clean the forming fabrics and rolls by hand with kerosene. Worker safety is a key driver of this mill and NALCO Water delivered a huge win in the eyes of the crew.

PAPER MACHINE CLEANING

Deposits in papermaking systems result in lost operating efficiency, excess energy use, off-spec product, increased material costs, and potentially hazardous working conditions. NALCO Water's innovative Paper Machine Cleaning programs are designed to address these challenges. This lets the papermaker improve the safety of their operations, increase on-machine efficiency, improve product quality, and optimize material costs – contributing to sustainability goals and their bottom line.

PAPER MACHINE CLEANING ORDERING INFORMATION

Please contact your NALCO Water sales engineer or the NALCO Water Expertise Center for Cleaning to learn more about NALCO Water's best practices for machine cleaning, or direct inquiries to naltex@nalco.com.

Delivers

- *Operator safety* – Routine cleaning of machine parts, frames, and floors of grease, microbiological growth, and other contamination keeps work areas safe for workers performing routine daily activities and maintenance while the machine is running.
- *On-machine efficiency* – Maintaining clean headbox, press rolls, machine frame, and other machine parts keeps buildup from breaking off and contacting the sheet causing defects, breaks, and other reductions in on-machine efficiency.
- *Machine cleanliness* – A clean workplace is not only safer, but also helps to motivate employees, impress customers, and improve product quality.
- NALCO Water's approach incorporates proven best practices to optimize the mechanical, operational, and chemical elements, while doing so in a safe and environmentally acceptable manner.

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