

# Cyclonaire Boosts Production, Reduces Spillage at P&G

#### **Case History of the Procter & Gamble Manufacturing Plant in Vallejo, Mexico**

# Background

The Procter & Gamble Co. manufacturing plant in Vallejo – the most established industrial area in Mexico City, Mexico – is a leading producer of dry laundry detergent, including popular Latin American brands Ariel,<sup>®</sup> Bold,<sup>®</sup> Safe,<sup>®</sup> and Rindex.<sup>®</sup> The Vallejo manufacturing plant is just one of Procter & Gamble's many global locations, including six other manufacturing sites and a corporate office in Mexico. Cincinnati, Ohio-based P&G boasts one of the largest and most profitable home, health, beauty, and food brand portfolios worldwide and employs nearly 140,000 workers in more than 80 countries. Other leading P&G brands include: Pampers,<sup>®</sup> Tide,<sup>®</sup> Always,<sup>®</sup> Pantene,<sup>®</sup> Bounty,<sup>®</sup> Dawn,<sup>®</sup> Pringles,<sup>®</sup> Folgers,<sup>®</sup> Charmin,<sup>®</sup> Downy,<sup>®</sup> lams,<sup>®</sup> and more than 200 other names. Three billion times a day, P&G brands touch the lives of people around the world, according to the company.

The company's \$17.15-billion fabric-and-home-care business is one of P&G's key divisions – accounting for almost onefourth of the company's total \$68.22-billion annual sales. Within that amount, laundry detergent – led by billion-dollar brand Tide – accounts for much of the year-after-year sales growth. According to the company, the average American woman spends seven to nine hours a week on laundry. Is it any wonder that detergent brands are a key component of the company's portfolio?

The P&G Vallejo plant, employing more than 1,000 workers, is one of the largest detergent manufacturing facilities in the world. Its soap is primarily distributed throughout Central America. The plant also pays special attention to the environment – ensuring that contamination and pollution are limited. As a result, the plant has reduced its water use and waste.

### Problem

Handling more than 100,000 tons of sodium carbonate, or soda ash, annually doesn't come without a price for the Vallejobased P&G plant. Plant managers noted a decrease in efficiency and productivity, excessive air consumption, and costly maintenance as primary operational problems with the existing railcar unloading system. As it was, the system wasn't capable of conveying the necessary 25 tons per hour to achieve maximum productivity. Instead, just over 11 tons per hour were regularly conveyed – an immeasurable loss of opportunity and cost. The system was the obvious bottleneck – causing an interruption in material flow. The cost of staying with that system was an estimated three times more expensive, according to the plant.



Additionally because of Mexico City's high elevation and low pressure, the plant's blower packages ran "hot" – requiring excessive electrical and air consumption that cost the company considerably. For instance, the blowers, which needed to be replaced every two years, cost \$15,000 annually in maintenance and replacement charges.

An efficient and dependable discharge system to transfer the sodium carbonate would reduce the risk of interruptions; provide for a cleaner, automatic operation; and would eliminate the need for transferring material in inefficient ways. The company's new system requirements included:

- · Increase the convey rate from the railcar to silo 10-15 tons per hour compared to the existing system
- · Improve efficiency of the equipment and the workforce
- · Eliminate downtime for the downstream processes
- Reduce maintenance costs
- Increase profitability
- · Provide an automated system to unload the entire railcar without shutting down the system
- · Incorporate two storage silos with the installation of one highly dependable pneumatic conveying system
- Overall improvement in convey rate, process reliability, simplicity of process, value, and consumption, while meeting installation and space requirements to ensure a trouble-free installation

# Solution

York, Neb.-based Cyclonaire Corporation is a manufacturer of bulk material handling systems, specializing in pneumatic conveying. The company supplies components as well as complete dilute, dense, and semi-dense phase conveying systems. Its services range from concept engineering and project management through start-up supervision. Cyclonaire serves all types of industries engaged in handling powder, and has extensive railcar unloading experience. Pablo Suzuri, the plant manager at the P&G Vallejo plant, became familiar with Cyclonaire and its products, having read about the company in trade publications and visiting its website. Cyclonaire supplies semi-dense conveying systems, which are the optimum solution for medium rate transfer of abrasive or friable materials.

To improve efficiency, convey rates, and decrease air consumption, the P&G plant decided on a high-capacity HC-Series semidense phase pneumatic conveying system from Cyclonaire. This decision was reached after months of planning, a review of recommended equipment from manufacturer Cyclonaire, and site visits.

The HC-Series conveyor system was matched with Cyclonaire CycloLift<sup>™</sup> railcar/truck connectors, Air Shoot<sup>™</sup> gravity conveyors, an intermediate-pressure (15 psig) Blower Package, a Pinch Diverter Valve, and Convey Line – all of which are designed for semi-dense phase vacuum loading/pressure conveying and railcar/truck unloading. The new Cyclonaire equipment was installed by a local contractor at the P&G rail siding approximately 100 meters from two storage silos. The equipment is in constant use at the Vallejo plant.

### **Advantages**

Prior to the installation of Cyclonaire equipment, P&G utilized an outdated mechanical bootlift style connection that was very cumbersome and leaked material at various locations from the connection. To remedy this problem, three Cyclonaire **CycloLift Railcar connectors** – one for each outlet on the three-hopper railcar – were installed to streamline rail unloading from the



hopper-bottom cars and eliminate spillage that can contaminate the area. Versatile CycloLift connectors adapt to various railcar outlet sizes using a patented airlift system to allow for more flexible and efficient railcar unloading.

CycloLift connectors come with steel adapter plates that move longitudinally to speed alignment of the boot seal with the hopper slide gate and cut down on time-consuming railcar repositioning. To elevate the boot from between the tracks and mate it firmly against the hopper slide gate, the CycloLift connector replaced conventional hydraulically activated mechanical linkages with pneumatically actuated lifters. The lifters were located under the top plate that carries the resilient rubber gate seal. When extended, the lifters created a tight boot-to-gate seal regardless of the tilt of the railcar or irregularities in the gate surface. During unloading, it automatically maintains its seal with the railcar to eliminate leakage. Conventional mechanical devices may not mate properly if the hopper opening and the lift mechanism are not in the same horizontal plane. This likely causes product to leak - contaminating the area and resulting in material loss.

From the outlet of each of the three CycloLift connectors, a 12-inch, dust-free Cyclonaire **Air Shoot Fluidizing Conveyor** was installed to serve a dual purpose in the complete system. First, they provided a means for the material to transfer to the HC-75 semi-dense conveyor after it has exited the railcar.



A vacuum-loaded Cyclonaire HC-75 Semi-Dense Phase Conveyor (High Capacity – 75 ft<sup>3</sup> volume tank), with three material inlets, conveys materials at more than 25 tons per hour.



Three Cyclonaire CycloLift<sup>™</sup> railcar connectors were installed beneath the tracks to streamline rail unloading from the hopper-bottom cars and eliminate spillage

Second, because each Air Shoot can maintain material in a fluidized state, sodium carbonate could move quickly with very low pressure.

The covered Air Shoot Conveyors featured consistent air flow to transfer product in a fluidized state at a shallow, horizontal angle with relatively low maintenance costs. Because there are no moving parts associated with Air Shoot conveyors, simple operation was ensured. Minimal overall room was necessary, keeping the unloading pit depth to a minimum. At the P&G plant, an existing pit was refigured to handle installation of the Air Shoot conveyors. Much of the service and maintenance access to the equipment was kept above ground; and no electrical components were installed within the pit. Aeration air for the Air Shoot was supplied through standard source aeration valving on the HC-75, eliminating the need for auxiliary blowers or expensive compressed air and added controls.



At the heart of the P&G system was the pneumatic conveyor model itself: a vacuum-loaded Cyclonaire **HC-75 Semi-Dense Phase Conveyor** (High Capacity – 75 ft<sup>3</sup> volume tank), with three material inlets. Each inlet on the HC-75 was connected to one of the CycloLift Connectors, via the Air Shoot conveyors that supplied material. The HC-75 Conveyor featured a high-level, radio signal sensor to ensure safe, automatic filling and included two, built-in Sight Glasses for added user assurance.

Cyclonaire HC-Series Conveyors have a conveying capacity of more than 80 tons per hour depending on the application. At P&G, the HC-75 was designed to more than double the convey rate previously moving just 11 tons of sodium carbonate to the storage silos or plant per hour. The new system easily exceeded the 25 tons per hour requirement. Because HC Series conveyors use only positive air pressure for both vacuum loading and pressurized conveying, there was no need for high-maintenance filtration at the rail side and no close-tolerance rotary valves that could result in lost air. Standard automated controls also allowed for minimal operator supervision.

One medium positive-displacement 350-hp **Blower Package** – using 1,000 cubic ft. of 15-psig convey air per minute – was installed to supply pressure convey air to venturi-vacuum load, ensure Air Shoot aeration, and fluidize and convey sodium carbonate into the 70-foot-high silos. The high-efficiency Blower Package moved materials at the right combination of line velocity and material-to-air ratio to minimize abrasion and maximize efficiency. The P&G Vallejo plant realized a \$15,000-annual cost savings by not having to replace the previous blowers biannually. The Cyclonaire Blower



A CycloLift<sup>™</sup> railcar connector elevates the boot from between the tracks and mates it firmly against the hopper slide gate – replacing conventional hydraulically activated mechanical linkages with pneumatically actuated lifters.



Three 12-inch dust-free Cyclonaire Air Shoot<sup>™</sup> Fluidizing Conveyors, which transfer material at a horizontal plane using low-pressure air, were installed from the outlet of each CycloLift<sup>™</sup> connector. Because minimal overall room is necessary, the unloading pit depth was kept to a minimum.

Package was custom engineered to suit the extreme elevation and climate characteristics of the area. Built-in sensors monitor the changing temperature and air pressure to account for extreme climate shifts or mild fluctuations.

To direct material obstruction free to two different silos, the company purchased a Cyclonaire **Pinch-Style Diverter Valve**. The valve was configured to a specific angle of divergence to match pipe routing considerations and maximize flow. Valves came standard with double-wall construction for extended service life. Ten-inch convey lines, including several convey line elbows, provided transfer of the material more than 100 meters to the two storage silos. No additional air boosters were necessary.



#### Summary

In all, the new automatic system has performed more than two times faster than the previous system, while reducing operator time each day and eliminating the need for one operator position entirely — a worker who previously oversaw railcar unloading. What used to take one hour in freight car maneuver time, takes only 10 minutes using Cyclonaire CycloLifts. Costsavings and power and electrical consumption were also realized because the system is fully integrated. The company said that an estimated \$281,000 annually would be saved in the reduction of energy consumption and decline in maintenance costs and replacement equipment. Additionally, spillage that once contaminated the environment was noticeably reduced.



A 10-inch-wide Pinch Diverter Valve directs material obstruction-free to two silos. The valve was configured to a specific angle of divergence to maximize flow, and came standard with double-wall construction for extended service life.

"Excellent equipment, but even better (was) the personal service and follow-up," the P&G Vallejo

plant manager wrote in a prepared description about the project. "What Cyclonaire quoted was achieved 100 percent." He said that throughout the project — from consultation and design to implementation and training — Cyclonaire engineers effectively oversaw every aspect of the project. Vallejo plant employees were enthusiastic about using the new equipment and liked its ease of use. The plant manager also said he would recommend Cyclonaire and its equipment to other Procter & Gamble operations.

The selection of Cyclonaire equipment used at the P&G plant is sold separately to meet the needs of individual customers, but can be integrated to form a comprehensive rail loading-and-unloading conveying system – as was the purpose at the P&G Vallejo plant.

To see photographs, dimensional drawings, and specifications for any Cyclonaire product, visit the Cyclonaire website at cyclonaire.com. To obtain more information and free literature, contact Cyclonaire Corporation, PO Box 366, York, NE 68467-0366; call 1-888-593-6247 or 1-402-362-2000; or send e-mail to sales@cyclonaire.com.

For more information on the project and equipment, visit cyclonaire.com or call 1.800.445.0730.

