

Case history

Problems in manufacturing industrial soaps, bleaches, and foaming and nonfoaming detergents led Puritan/Churchill Chemical Co. of Atlanta, Ga., to search for a better handling, blending, and packaging solution.

In March 1987, when the company began doing research to find mixing and blending equipment that would solve its problems, it had several objectives in mind. It wanted to increase production rates, reduce the costs incurred for direct labor in its soap and detergent manufacturing line, improve the quality of its finished product, and streamline its overall manufacturing process.

In April, the company replaced its four batch mixers with a single blending and packaging system, manufactured by Continental Products Corporation. As a result, Puritan met its objectives: it increased production by 20 percent, reduced direct labor costs by 60 percent, and significantly improved the quality of its blended product.

Mix times limit production output

Before the new blending and packaging system was installed, Puritan/Churchill's blending equipment consisted of two 6,000-pound-capacity vertical auger mixers, one 2,000-pound-capacity horizontal



Puritan Churchill's 6,000-pound-capacity Blend/Pak system replaces four batch mixers. The system consists of a Rollo-Mixer (white unit with orange discharge spout) and a bag dump station (yellow unit) with a self-contained DCE dust collector, mounted directly above the mixer.

Blending system wrings problems out of detergent manufacturing operation

Puritan/Churchill Chemical's new blending and packaging system increases productivity by 20 percent and decreases direct labor costs by 60 percent.

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paddle-blade mixer, and one 2,000-pound-capacity ribbon mixer, each driven by its own 25-horsepower electric motor.

According to John Todd, Puritan/Churchill's vice president of manufacturing, mix times in these units were too high. For example, the vertical auger mixer required 2 to 3 hours to blend 6,000 pounds of laundry powder.

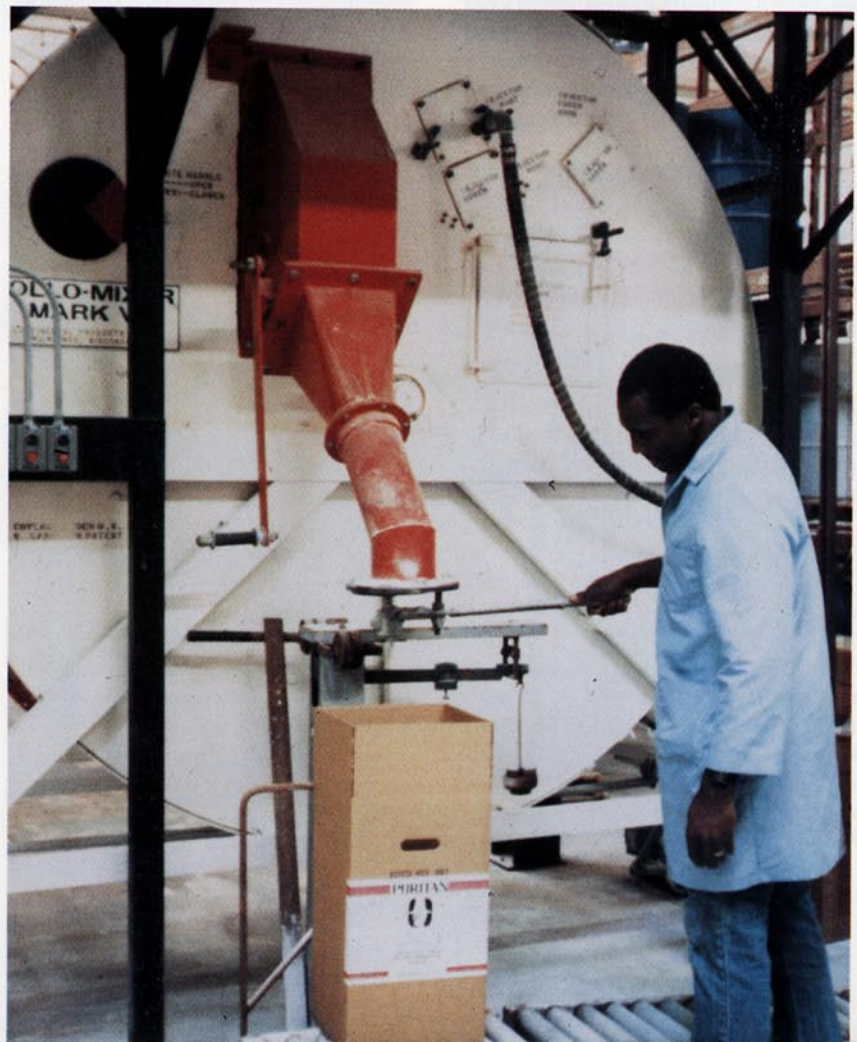
In addition when liquid additives such as surfactants and fragrances were applied in these mixers, hot spots, agglomerations, and uneven dispersion of liquids onto dry product resulted.

Product changeover was also a problem. Changing from blending a foaming detergent to blending a nonfoaming one required long periods of downtime while the mixer was cleaned to prevent carryover from one batch to another. As a result, labor costs for cleanout were high.

Finally, the ability to uniformly blend ingredients of varying particle size and density was always a challenge for the four mixers Puritan/Churchill employed.

Product testing proves successful

Initially, the company thought it could increase its production rate by adding more



Uniformly blended laundry powders flow by gravity from the Rollo-Mixer into Puritan Churchill's containers. Product uniformity is maintained throughout discharge, ensuring that the contents of all containers processed from a batch are the same.

mixers of the same kind it was using. However, when a committee examined this plan more closely, it concluded that adding more mixers would merely compound the costs of operating them in greater proportion than the increased productivity would afford. The committee decided to look for a blending and packaging method that would yield the company a greater return on its investment.

After reading an ad in a trade magazine, Todd contacted Continental Products and arranged to go to its testing facility in Wisconsin to witness blend tests of two of Puritan's most difficult-to-mix products—powdered bleach and powdered laundry detergent.

When Puritan's powdered bleach was mixed in Continental's Rollo-Mixer, test

results showed that product uniformity was achieved in a mix time of 5 minutes. In contrast, according to Keith Rhodes, Puritan's chief chemist, Puritan's horizontal ribbon mixer was unable to reach this degree of uniformity after 20 minutes of mix time.

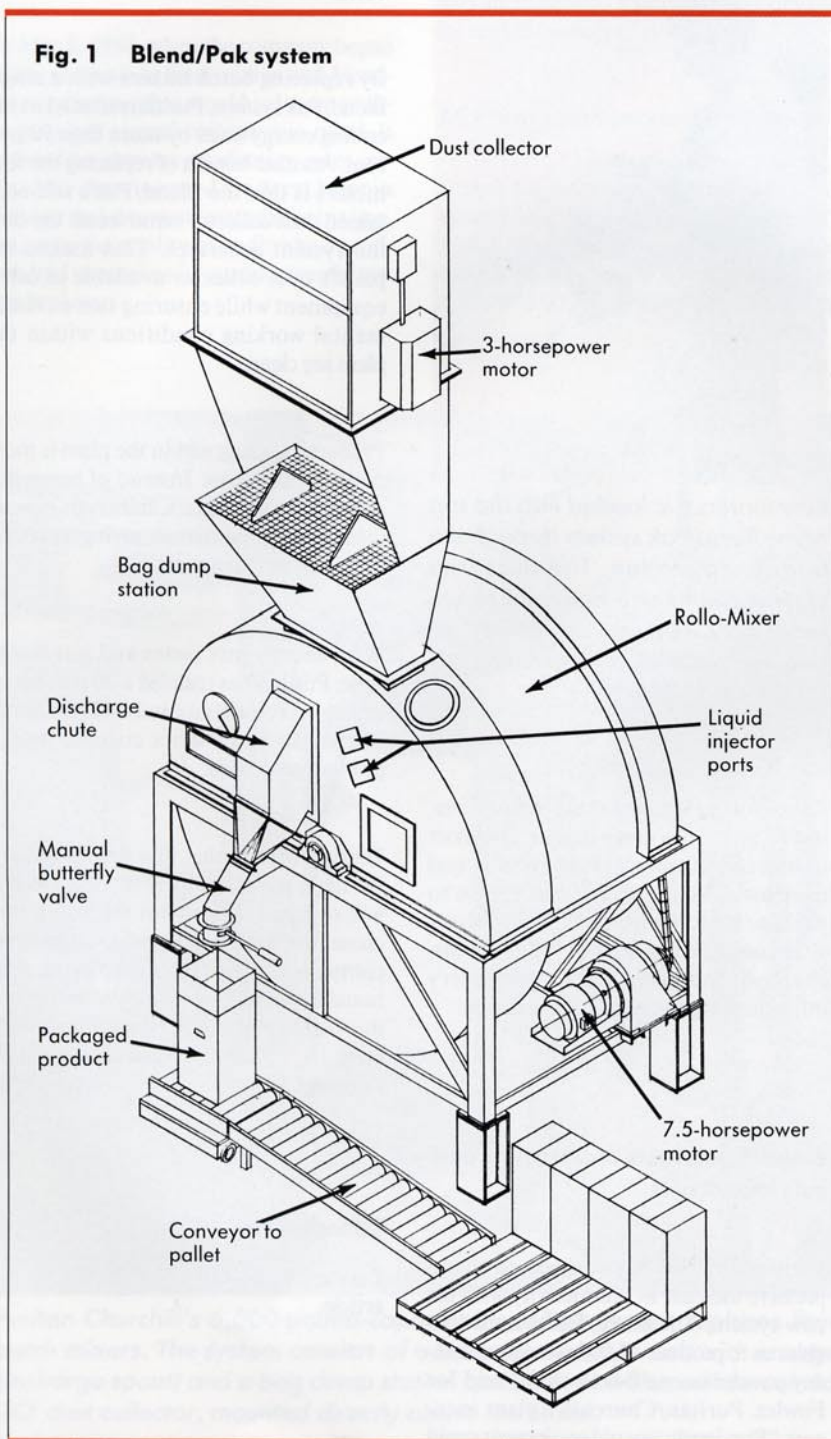
The test on the powdered laundry detergent involved adding liquid surfactants and fragrances in free-fall impregnation within the Rollo-Mixer. This method of spraying liquids onto dry product in free-fall eliminated hot spots and agglomerations, resulting in a uniform blend.

After each finished test batch was unloaded from the Rollo-Mixer, Rhodes examined the mixer for its clean-out ability. At one point he remarked to Todd, "John, this Rollo-Mixer is cleaner after discharge than our mixers are after we are done cleaning them."

Blend/Pak system resolves production problems

In April 1987, Puritan replaced its four batch mixers with one 6,000-pound-capacity Blend/Pak system (Fig. 1). The system's two major components are a Rollo-Mixer (with a 7½-horsepower motor and drive, a liquid spray lance, and customer furnished packaging equipment) and a bag dump station (with a self-contained DCE dust collector with a 3-horsepower motor and drive), mounted directly above the Rollo-Mixer. This compact system, which measures 10 feet wide by 10 feet deep by 20 feet high (including the dust collector), significantly reduced the floor space required for production.

Raw material is loaded through the bag dump station, where it is gravity loaded into the Rollo-Mixer. There, it is continuously tumbled, turned, folded, and cross mixed. A premeasured amount of each surfactant and fragrance is pumped under pressure into the Rollo-Mixer and onto the dry product in free-fall in a finely atomized spray pattern. Puritan found this method of applying liquids excellent for hydrating some of its raw materials.



The mix time for laundry powder in Puritan's 6,000-pound-capacity auger mixer was 2 to 3 hours. The Rollo-Mixer does the job in 15 minutes.

After mixing is complete, the discharge chute of the mixer is opened, admitting finished product into Puritan's packaging equipment. The packaging equipment then controls product discharge to fill containers of various sizes and capacities.



Raw material is loaded into the top of the Blend/Pak system through the bag dump station. The dust-free system allows one operator to unload a 2,400-pound pallet of bagged material in 10 minutes.

Once product is mixed in the Rollo-Mixer, it stays mixed in a uniform state. It will not unmix or go through phases of mix and overmix. Therefore, Puritan is able to package material from the Rollo-Mixer with complete confidence. The first discharge from a given batch is like every other discharge—completely uniform.

Blend/Pak boosts productivity and cuts labor costs

Puritan/Churchill has experienced an impressive increase in productivity with the new system. The Blend/Pak system "enables us to produce 45,000 pounds of laundry powder in one 8-hour shift," said Joe Fowler, Puritan/Churchill's plant manager. "Previously, our old equipment could only [collectively] produce 25,000 pounds of this same laundry powder." Fowler pointed out that the increase in productiv-

ity per shift allows Puritan to handle its favored customers' demand orders routinely.

"Our chemists have observed a significant improvement in the mixture of raw materials using this mixer," Todd said, "and we are now capable of hydrating our powder products to improve our quality as well as significantly lowering our raw material costs."

By replacing batch mixers with a single Blend/Pak system, Puritan reduced its operating energy costs by more than 90 percent. Another benefit of replacing the four mixers is that the Blend/Pak's self-contained dust collector removes all the dust the system generates. This makes the plant's dust collector available to other equipment while ensuring that environmental working conditions within the plant are clean.

Product handling within the plant is more concentrated now. Instead of being dispensed to four mixers, materials now go through only one station, saving space and reducing handling costs.

With shorter mix times and less downtime, Puritan has realized a 20 percent increase in productivity and a 60 percent reduction in direct labor cost per unit of product processed.

Todd estimated that this streamlining of Puritan's manufacturing process has and will realize a 73 percent return on purchase investment per year. Currently the company is considering employing additional Blend/Pak systems in other parts of the Atlanta plant, in its operation in Galesburg, Ill., and in the Australian plants of Puritan/Churchill's parent company. **PBE**

Editor's note

Puritan/Churchill contributed to this article.



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