Dairy Foods Magazine
May 1995 Plant Operations Application

Pump Heavy Cream Without Shear Damage

Centrifugal pump improves cleanability, reduces maintenance and noise

H.P. Hood's plant in Vernon, N.Y., manufactures cottage cheese dressings and a premium, all-natural sour cream. Both products, but especially the sour cream, require minimal shearing of the cream used as a base. Shearing damage to this key ingredient causes the product to lose body and fall below strict quality standards.

Problems occurred when Hood increased production, and required faster flow rates. The cream storage tanks were located more than 250 ft from the processors. At the desired flow rate of 800 lb per minute, the 40% cream mixture at 40°F generated frictional losses of 82 ft of head through the 2-in piping.

To overcome this high head pressure, Hood installed a traditional rotary lobe pump. However, this soon became a maintenance headache, requiring replacement of sleeves and shaft o-rings twice a week. The lobe pumps also required tear-down and manual cleaning, reducing the efficiencies of a system that was otherwise fully CIPable.

Switch to a centrifugal pump

With these concerns in mind, Carl Boyson, Hood processing foreman, began looking for alternative pumps. "We were looking for efficient cream transfer with a minimum of shear," he says. "We frankly didn't think of using a centrifugal until a Fristam representative suggested we explore it."

Fristam suggested its FPX 3451/240 pump with a 5-HP 1750-RPM motor. Several factors contributed to this selection. The low-speed motor that would minimize whipping of the cream was a primary requirement. To reduce the potential for shear, a pump head with a full-sized impeller was chosen to allow as little area as possible for product recirculation. In addition, a deep volute housing was selected to produce a low ratio of shearing surfaces to volume. Shear damage to the product was also minimized by tight internal tolerances between the impeller, housing and cover.

"Fristam was confident they could generate the required discharge head but we were not certain about the resulting shear. Centrifugals had been used for cream transfer but seldom, if ever, over such distances. As a result, we agreed to install the pump on a performance-guaranteed basis to see if the anticipated added shear would hurt our yields," says Boyson.

As it turned out, Boyson authorized full payment after two weeks of production. "The yields were as good as ever, indicating that shear was not a problem. We even noticed that after filling a 4,000-gal tank we have minimal foam, which indicates to us that the cream is hardly being whipped. The pump was also able to handle our production requirements easily."

After six months, Hood hasn't yet had to change a seal. And it can CIP through the pumps as well, reducing maintenance time and also eliminating a quality concern. An unanticipated benefit was a drastic reduction in noise. Boyson notes that you can't even hear the Fristam run compared to the positive pump.

"We were quite pleased that the Fristam worked out so well. In fact we haven't even reworked the piping from the positive displacement pump, so the Fristam is still discharging from the side," says Boyson.