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CASE STUDY:

RIBBON BLENDER

INCREASES OUTPUT 25-FOLD AT DIVERSIFIED CHEMICAL PRODUCTS

A Munson ribbon blender provides the flexibility, output, containment and ease of cleaning required to produce a range of specialty chemical powder blends. | By Munson Machinery Co.

Diversified Chemical Products, Inc. (DCP) began in 1974 as a small, family-owned research and manufacturing business. In the last two decades, the company has grown rapidly as a custom manufacturer of FDA-regulated formulations of laboratory, medical and dental products, in addition to chemical cleaning powders.

“We’re diverse in what we manufacture and package,” says Jim Longo, DCP president. “We either develop technology and private-label it for large dental and medical distributors, or we manufacture product according to customer specifications under the customer’s label.”

“We make powder blends for specialty functions within the dental industry,” Longo explains. “These include cement removers, powders that remove impression material from molds, products for fabrication of dental prostheses and for cleaning of dental instruments, in addition to other custom powders for dental laboratories.”

Other products range from cleaners used by jewelers to high-level enzymatic cleaners used on printed circuit boards.

Playing a central role in DCP’s growth is a Munson 40 ft³ (1.13 m³) HD-36-SS ribbon blender that has been producing the company’s powder blends since 2003. It now processes some 45 formulations totaling about 750,000 pounds (340,194 kg) annually, a leap from 30,000 to 40,000 pounds (13,607 to 18,144 kg) blended by the mixer when new.

The FDA-compliant, all stainless-steel machine is configured with a bag dump station at its intake and a receiving hopper and screw conveyor at its discharge to transfer materials to a surge hopper feeding a filling and packaging line.

Powder blending a mainstay at DCP

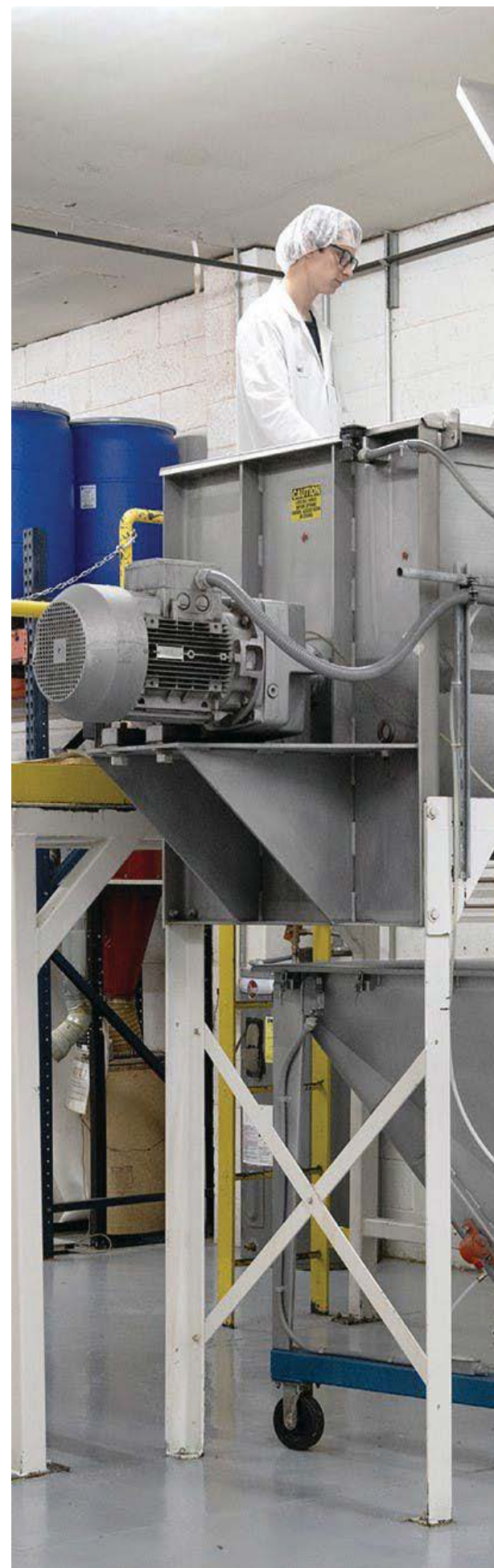
“Our blender is adaptable and flexible and has been our most consistent piece of equipment,” says Longo. “Numerous machines here have been replaced or upgraded, but the ribbon blender has been a mainstay for 50 percent of our business, which is powder blending.”

“The machine has never required an overhaul and has enabled us to take on projects that we previously could not handle,” Longo continues. “We fill everything from 55-gallon (208-liter) drums all the way down to small, individual unit-dose packets. If you consider the range of products processed and that we are moving three quarters of a million pounds of powder per year, our ribbon blender is constantly running.”

Longo says that batch sizes range from 500 to 2,500 pounds (227 to 1,134 kg), and that the blender yields an accurate mix that passes quality control specs. When engineering a product for a customer, a typical batch falls between 1,800 and 2,100 pounds (816 and 953 kg).

He adds that the blender’s simple design helps when transitioning between products, allowing for cleaning and sanitizing with relatively little downtime. “We change seals regularly, depending on which product we’re going into, to eliminate cross-contamination. The unit has air purge for the seals, which keeps out most of the powder. But after a day when we have finished five different blends, everything is broken down, cleaned, stripped, scrubbed, sometimes seals changed, and then it’s set up for the next blend, which takes place a day or two later.”

Dust containment is vital for DCP. “To manage the dust created by the materials we process, we fit the bag dump station with pleated, 1-micron filters for some applications and submicron filters for others, which we can easily swap in and out.”





◀ The blender is configured with a bag dump station at its intake and a receiving hopper and screw conveyor at its discharge to transfer materials to a surge hopper feeding a filling and packaging line.

📷 All images courtesy of Munson Machinery Co.



▲ Jim Longo, president of Diversified Chemical Products.

◀ The bag dump station is fitted with pleated, 1-micron filters for some applications and submicron filters for others.

▼ The blender's outer ribbons are pitched to move material in one direction, while inboard ribbons are pitched to move material in the opposite direction.



Agitator design achieves uniform blends, sanitizes rapidly

Given the uniform dispersion needed for materials having varying densities and particle sizes, the ribbon blender remains optimum for DCP, compared to a plow- or paddle-style machine. “Some ingredients might only weigh 10 or 15 pounds in a 2,000-pound (907 kg) batch,” explains Longo. “Some might be a fraction of a percent.”

The blender’s semi-helical arrangement and counter-flow agitation uniformly disperse the ingredients throughout the mix; the outer blades extending to the vessel wall are pitched to move material in one direction, while inboard blades are pitched to move material in the opposite direction.

“You have the two outer bands moving in a direction counter to the inner flow, and the two edges mixing together,” Longo explains. “We have a number of powders containing enzymes that have to be accurately dispersed and verified through QC analysis. We achieve accurate dispersion consistently.”

The most challenging materials the blender handles include “fluffy” low bulk density powders, many of which require large liquid additions through the blender’s internal spray lines. Longo says, “Out of the 45 powders blended at DCP, at least 40 include some form of liquid injection into the mix, whether customers require fragrances, dyes or colors added, or formulas requiring liquid ingredients.”

According to Longo, cleaning proceeds quickly and easily, without the need to remove the ribbon blade agitator element. “After many years of performing regular maintenance, my team has cleaning down to a science.”

Growth plans include larger and smaller blenders

DCP is looking to move to a larger facility to increase capacity. “We’ve maxed out this facility as far as square footage,” says Longo. “If we had more space we would install a larger blender, which would take up the downtime and run concurrently with the existing unit.” In the meantime, DCP is contemplating adding a smaller Crossley Economy ribbon blender, also offered by Munson, to handle some sophisticated minor blends.

“These minor blends might have three or four minor ingredients that are added to the larger batch,” explains Longo. “It could be a color batch, a fragrance batch, or a blend of enzymes. We prepare these in a small planetary blender that can only handle about 35 gallons (132 liters) at a time. We are looking to get a machine that can handle batches around 10 to 20 ft³ (0.3 to 0.6 m³).”

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