ISSN 1720-4011
ANNO 12 - NUMERO 6 2013

NutraCos

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published by B5 srl • Via Mario Donati, 6 • 20146 Milano (Italy)

Arizona Nutritional Supplements boosts capacity 500% with ribbon blender, rotary batch mixer

STEVE KNAUTH

Munson Machinery Co., Inc.
210 Seward Avenue
Utica, NY 13503, USA

Tel +1 315-797-0090
info@munsonmachinery.com
www.munsonmachinery.com

Arizona Nutritional Supplements (ANS) is a contract manufacturer with two production facilities in Chandler, Arizona (AZ) – one on Beck Avenue and one on Chilton Drive. The Chilton plant focuses on protein, whey, meal replacement, and other powders packed in plastic jars, plastic stand-up-pouches, and stick packs. The Beck plant produces nutritional supplements in the form of tablets and capsules, which are packaged in bottles and blister packs.

Munson 8.5 m³ capacity rotary batch mixer achieves batch uniformity in 3-5 minutes, cleans quickly, and saves energy.

"Due to high growth in nutritional supplements, our powder business has increased by over 500% in last few years," notes Jeff Neal, ANS Plant Manager and Director of Operations at the Chilton Facility. "That's indicative of what's happening worldwide, and why we needed more mixing and blending capacity."

Previously, ANS was blending powders for its tablets, capsules and bulk powder products at the Beck facility using five Double-Vee-Cone Blenders and a 3.5 m³ ribbon blender. Because this equipment could not meet recent increases in demand, the company relocated the bulk-products portion of its powder processing to the Chilton plant where it installed a Ribbon Blender and a Rotary Batch Mixer, both from Munson Machinery.

The move also enabled the company to dedicate the original Vee-Cones and Ribbon Blender at the Beck facility to the processing of powders for tablet and capsule production.

CAPITALISING ON THE DIFFERENCES BETWEEN STATIONARY AND ROTARY MIXERS

ANS fills custom orders for over 200 customers worldwide, and performs numerous product changeovers daily. It was therefore critical for the new mixing and blending equipment to achieve uniform blends comprised of materials having diverse particle sizes and flow characteristics, and to do so across a wide range of batch sizes.

Bulk ingredients are fed into the mixer's intake chute through a hopper at mezzanine level as the mixing drum rotates, shortening cycle times.

Equally important was preventing cross contamination and minimising downtime between production runs, all while complying with FDA and GMP standards.

To satisfy these and other requirements, ANS installed two types of bulk solids blenders: a 14.2 m^3 Ribbon Blender, and an 8.5 m^3 Rotary Batch Mixer. All product contact surfaces of both machines are stainless steel with large weld radii ground and polished to mirror finish. "They're designed for easy, fast and effective washdowns," Neal explains. Two machine types were specified because each yields significantly different advantages.

The Ribbon Blender, which consists of a stationary, U-shaped trough and a ribbon-shaped agitator blade that is forced through the material, is "ideally suited to products requiring high-shear such as whey, soy, protein, and greens," says Neal, noting that "high shear also creates friction which causes sugar- and fructose-based powders, such as drink mixes, to heat and form clumps. The rotary mixer, on the other hand, can handle both."

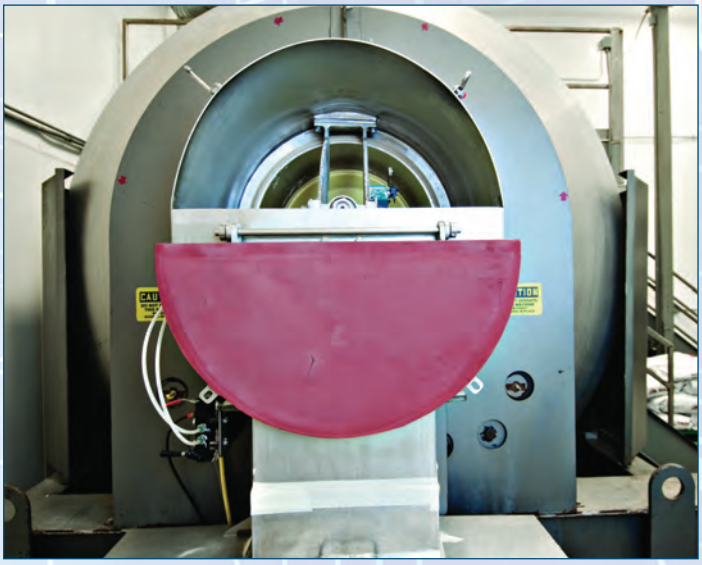
The mixing vessel of the Ribbon Blender is larger than that of the Rotary Batch Mixer's, but its overall output of approximately 22.5 tonnes/day is about the same, due to longer mixing and cleaning cycles. In terms of cleanability, the Ribbon Blender has a shaft penetrating both sidewalls of the mixing chamber through seals which contact material and require cleaning. In addition, at the end of each production run, a "heel" of material remaining at the bottom of the trough must be manually removed before sanitising the machine. However, says Neal, "thanks to tight tolerances between ribbon blades and blender trough, product heel is minimal."

"One thing I like about the ribbon blender is that it's less expensive than the rotary mixer, and gives us good return on the batch sizes we run," he says.

However, the Rotary Batch Mixer cleans faster, operates more quickly, and uses dramatically less energy, according to Neal; 30 kw to rotate the drum, versus 74.5 kw to drive the blades of the ribbon blender.

"Where a ribbon blender may take 20 minutes to achieve batch uniformity, the rotary unit takes only three to five minutes, which is a huge difference," he points out. The shorter cycles are the combined effect of four machine characteristics: i) rapid gravity feeding of ingredients through a hopper into the front of the machine; ii) gentle but rapid four-way mixing action inside the unit – tumble, turn, cut and fold; iii) the ability of the machine to continuously mix during loading and discharge; and iv) fast and complete discharge after mixing.

As for changeovers, two internal spray jets facilitate cleaning as the drum rotates. Also aiding cleaning, the mixing flights are continuously welded to the drum wall and the interior is surfaced to a mirror finish. Further, each batch discharges completely – meaning no product heel remains, allowing the unit to be immediately washed and sanitised with the required fluids.



The mixing drum rotates continuously during discharge, preventing segregation of the blended batch.

"In my view, rotary is the way of the future, and why we're trying to transition more of our customers in that direction," notes Neal. "But some still insist on using ribbon blenders for their products, so we offer both."

The Sliding Intake Chute of the Rotary Batch Mixer allows rapid access to the drum interior for cleaning and inspection.

TAKING A PHARMACEUTICAL APPROACH TO QUALITY CONTROL

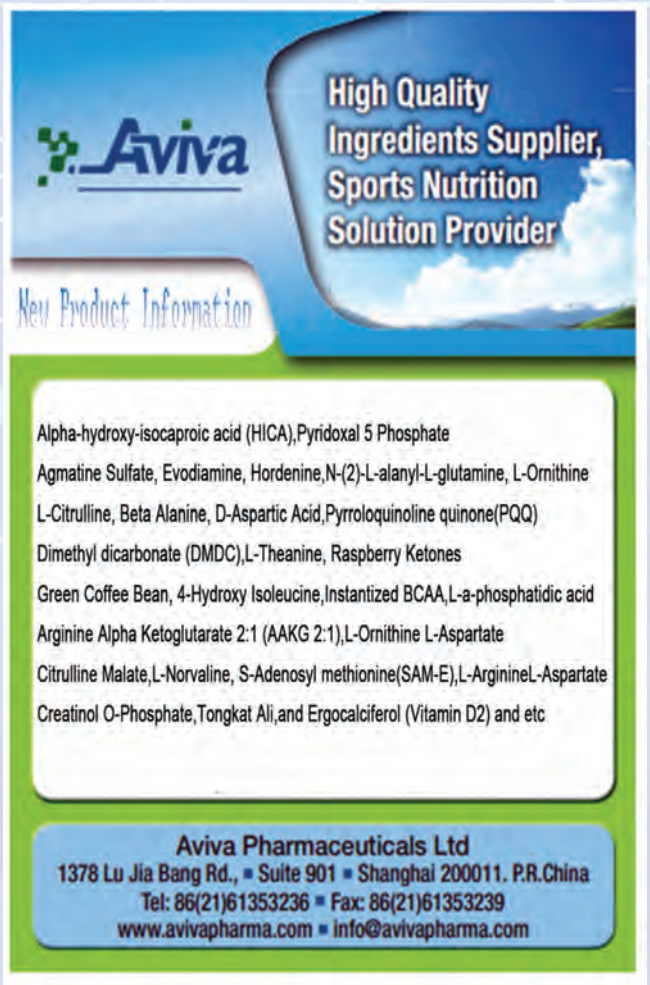
ANS's two facilities, which together span 18,580 m^2, have an inventory of some 3000 raw materials, each of which arrives in 22-26 kg plastic bags or plastic-lined boxes. They pass through the Beck facility first, where the quality control lab tests for potency and purity. Powders are then

Powders are manually added to the 14.2 m³ capacity ribbon blender in which ANS mixes whey, soy, protein, and greens requiring high shear.

measured and weighed according to the customer's recipe, and sent to Chilton for processing and final packaging. The lab also tests samples of finished product before shipping.

After discharging from the Munson units, finished powder is fed by a 203 mm diameter auger into 600 kg bulk bags and transported to the filling area. There, the bags are lifted, and the finished product is gravity fed into other hoppers that supply the various packaging lines, which include one stick line, three pouch lines, and three jar lines, one of which is dedicated to small runs.

To help prevent cross contamination and allergen risk between products, the mixing/blending and packaging departments are separate from one another, as are the machines they contain. Each individual room maintains a positive air pressure. "We have adopted the same kind of mindset as the pharmaceutical industry," notes Neal. Finished sizes range to 20 g for stick packs, 60 to 100 g for stand-up pouches, and 100 g to 2.2 kg for jars.

Neal says he's been very pleased with the performance of the rotary batch mixer and ribbon blender since they were installed. He's also pleased that more people are opting for things like healthy protein, whey, soy, vegetable and other shakes for breakfast instead of pancakes or bacon and eggs. "It's good for them, and for us."

Arizona Nutritional Supplements
Tel +1 480-966-9630
jneal@aznutritional.com
www.aznutritional.com