STRATEGIES FOR PROCESS CONTROL & PLANT MANAGEMENT

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PROCESS ENGINEERING

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Blending microbes gets a gentle touch

United-Tech Inc. produces microbial formulations that are used to break down or detoxify organic compounds, greasy spills and other contaminants, leaving behind carbon dioxide and water. The powdered products contain proprietary blends of microbial cultures, enzymes, various micro- and macro-nutrients, and flow-enhancing additives.

"These products are designed to speed the bacterial degradation processes that already occur in nature without the addition of any chemicals and with no further damage to the environment," explains Art Barnard, who founded United-Tech in South Garnett, Tulsa, in 1993.

Blending of bacteria with additives in ratios as low as one part to 40 presents unusual challenges. The bacteria will be destroyed unless handled gently and blended rapidly, yet the distribution of bacteria throughout the batch must be 100% uniform.

United-Tech produces bioaugmentation formulations that are used to maximise natural bacterial degradation processes. To give the products a long shelf life and make them easy to transport, store and apply, they are produced as powdered formulations that are, typically, mixed with water and sprayed on the contaminated media.

Blending of the raw ingredients into finished formulations had been outsourced to a third-party vendor for many years, but in 2002, to save money and streamline manufacturing operations, the company brought blending in-house.

After rejecting various types of ribbon and paddle blenders (too much friction) and V-cone blenders (excessive cycle times), United-Tech chose a rotary-style batch mixer, the Model MX-10-SS Mini Mixer, from Munson Machinery of Utica, New York. This is a scaled-down version of Munson's Rotary Batch Mixer, with a total volume of 623 litres and a blending volume of 311 litres.

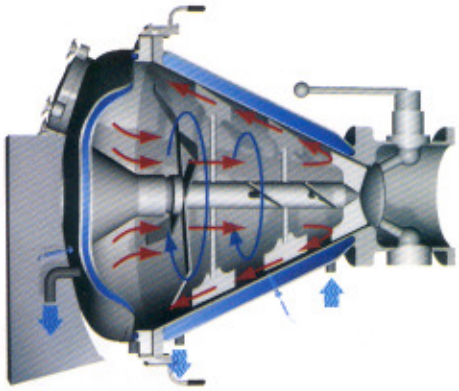
The mixing vessel has no internal moving parts, rather its interior is fitted with evenly spaced baffles that gently tumble, turn, cut and fold the powdered ingredients as the drum rotates. This cascading action creates a fluidised condition that ensures uniform blending, minimises product degradation and prevents the formation of stagnant zones.

The lifting action of the mixing flights also serves to direct the material to the discharge spout which, when open, promotes 100% evacuation of the batch to an enclosed screw conveyor feeding an automated filling line.

"The mixer consistently discharges completely, leaving no residual material behind," said Barnard. "We can blend 227kg every three to five minutes with this blender, and have found it to be equally effective in blending batches that comprise only a small percentage of rated capacity."

The mixer has run problem-free since 2002, according to Barnard, who is ordering a number of the units for United-Tech's other facilities. "Once we standardise all of our worldwide mixing operations on Munson's Mini Mixer, our engineers in the US will be able to work closely with their colleagues overseas to assist in training, operation and troubleshooting."

The United-Tech bioaugmentation products are being used to treat chemical- and petroleum-laden soil and groundwater, to remove unwanted organics and reduce sludge volumes in both industrial and municipal wastewater-treatment facilities, as well as remove organic sludges from drain lines.



Mix and bind

Potential cost savings, shorter cycles and fewer processing steps than for traditional wet agglomeration await pharmaceutical processors adopting the Hosokawa Micron Cyclomix route to melt binding agglomeration.

The unit is designed to provide high heat transfer rates for rapid heating and cooling. This enables fast dispersion of solid binder into the base material, with homogenous distribution of the melt on single particles.

The process is being used for manufacture of pharmaceutical dosage forms, such as sustained release, improved solubility and transdermal, and where stearic acids, lipids or waxes are applied to mask the bitter taste of active ingredients.

Oils and lubricants manufacturer Millers Oils has installed three 18-tonne blending vessels. They have a blending capability from 2,500 to 17,000 litres and will be used to blend high volume grades such as hydraulic oils, diesel engine oils and textile/industrial lubricants. Established more than 120 years ago, Brighouse-based Millers Oils has grown from a small, family-run company to employ more than 100 people, with distribution depots based in Aberdeen, Glasgow and Leicester. It also supplies an extensive range of premium products to the truck,engineering, automotive and retail markets.