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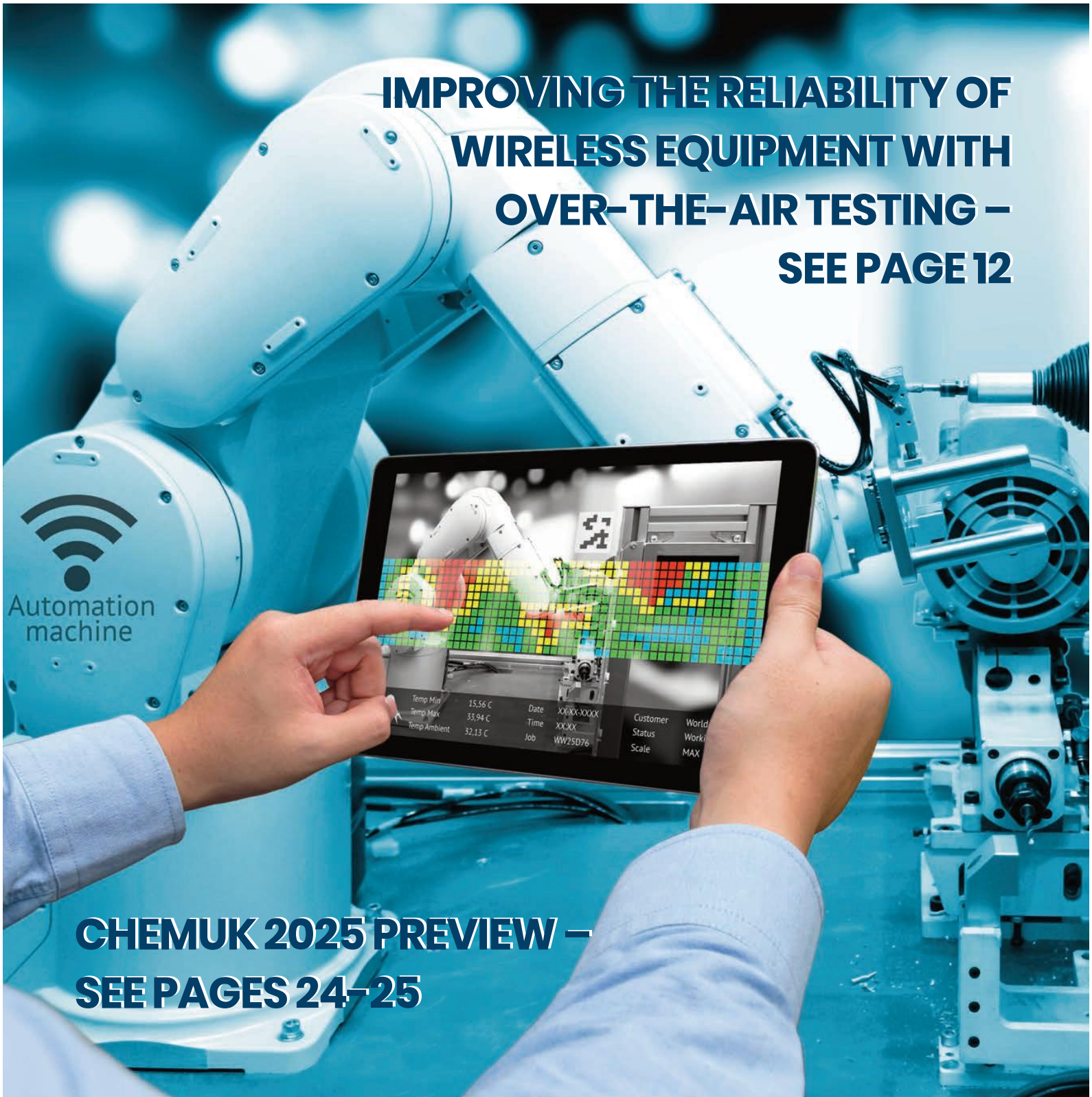
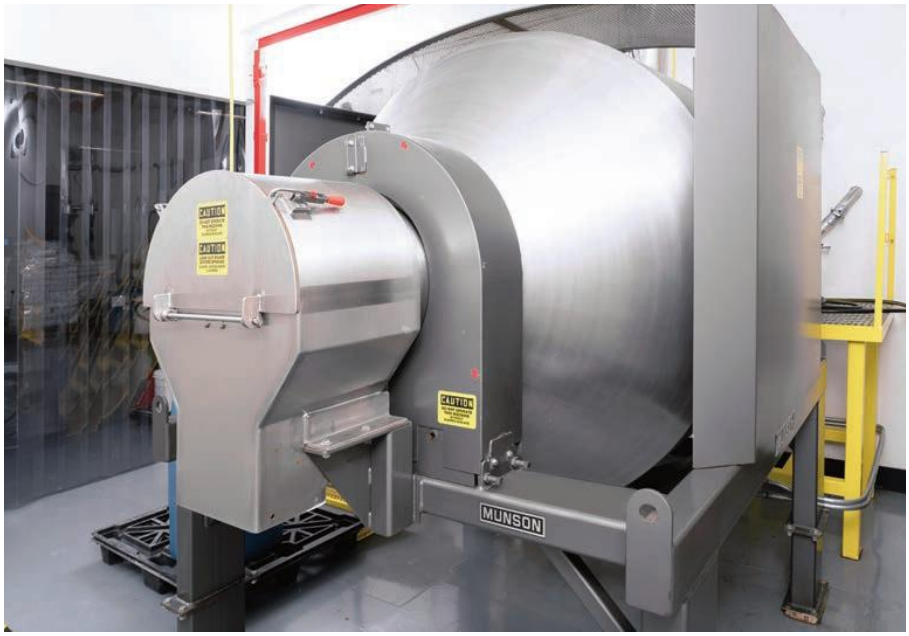


IMPROVING THE RELIABILITY OF WIRELESS EQUIPMENT WITH OVER-THE-AIR TESTING – SEE PAGE 12

CHEMUK 2025 PREVIEW – SEE PAGES 24-25

MIXER MAKES CUSTOMISATION POSSIBLE

A Rotary Batch Mixer from Munson Machinery has been instrumental in enabling Nutraceutical Research Sciences to develop proprietary manufacturing processes



NRS (Nutraceutical Research Sciences, LLC) is a private-label manufacturer of nutraceuticals and novel ingredients. The company's products range from anti-aging supplements and sports nutrition to vitamins and meal replacements. NRS has developed proprietary manufacturing processes that rely on a model 700-TS-50-SS Rotary Batch Mixer from Munson Machinery.

Most batches include one or more liquid additions, which are introduced into the 1,416 L mixer through spray bars with exchangeable spray tips, enabling the addition of aqueous and oil-based liquids by the litre or millilitre and as a fine vapor. The spray bars operate in conjunction with subsystems for heating and cooling the liquids and dehumidifying and pressurising the mixer vessel. "We have full control over how we process each product," said the company's late founder, John Anderson, who passed away before this case study was published.

Customisation of the manufacturing process enables Nutraceutical Research to "micro-encapsulate or coat the ingredients, and then add other things, like flavours, on top of that to build a larger particle," said Anderson. The mixer's tumble-turn-cut-fold action ensures complete coverage by the liquid additions, "It enables us to coat every single particle."

He also connects a dehumidifier to the mixer to remove moisture from the vessel, so he can make one liquid addition after another. It's a process that a rotary mixer handles well. He said: "It's much easier than with a V-blender because you have to exchange the air on the fly. The exhaust air will pick up a lot of material, and you'll have a huge loss." The rotary blender, on the other hand, minimises dusting by its gentle mixing action and by a single seal preventing dust leakage from the drum.

The mixer's inlet and outlet remain stationary while the drum rotates, allowing hard piping to the discharge of an upstream screw conveyor or the cyclone separator of a pneumatic conveying system. Vessel rotation during loading and unloading reduces cycle times and prevents segregation upon discharge, which Anderson noted is fast and complete, maximising yields. "I've used pretty much every kind of blender, including double-cone blenders and V-blenders, and neither can be loaded or discharged as quickly."

Nutraceutical Research's processes are developed in its R&D lab. "We built a miniature replica of our process so we can test products in very small batch form—one or two or five kilograms—to create the technique, the technology and the blending instructions," said Anderson.

The pilot-scale work ensures that each process can run non-stop. "The name of the game is continuous processing," Anderson said. "When you start the process, you continue through all the steps until it's completed, discharged, and out of the mixer." While every product requires an individual

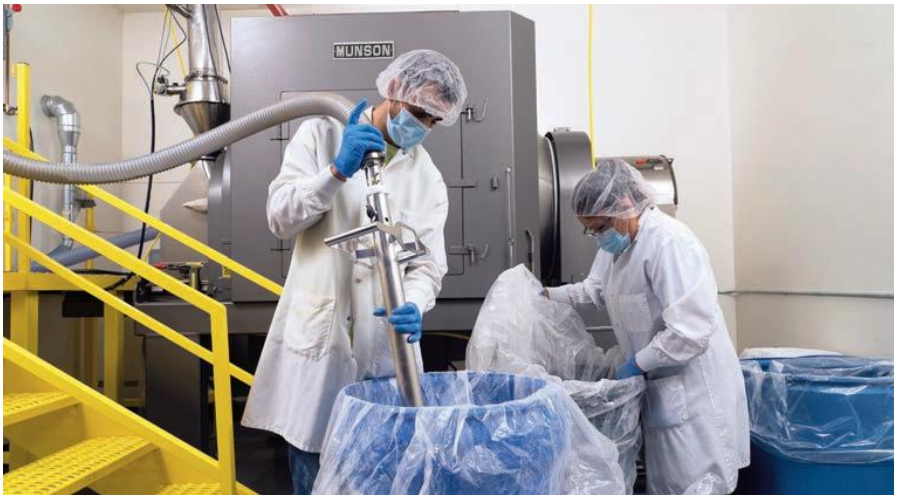
EXPANSION OF REGENERATIVE OXIDISER RANGE

Following the acquisition of Donau Carbon Technologies (DCT) by the Babcock Wanson Group in 2022, the company has expanded its range of regenerative oxidisers and is now able to offer complete solvent recovery systems to help reduce customers' carbon foot print and meet increasingly stringent emission limits for solvents and volatile organic compounds (VOC).

DCT solvent recovery systems feature activated carbon adsorption, using steam or inert gas for the regeneration. A distillation section (batch or multi-columns) allows for a very high level of purity – frequently exceeding international standards - for the recovered solvents to then be reused in production, making for a rapid return on investment. These solvent recovery systems are easy to use and, because they are modular, can be expanded and reconfigured to meet changing site requirements. With its compact size, plug and play design, plus easy maintenance, the latest solvent recovery system, the X-CSR, has been specifically designed for printers using smaller solvent quantities (as little as 300 tons/y), extending this valuable technology beyond the traditional, large print plants.

Babcock Wanson UK has been providing oxidisers for many years but with the addition of DCT regenerative and recuperative oxidisers can now meet a wider range of industries and requirements than ever before. DCT regenerative oxidisers enable up to 99% VOC abatement by increasing the polluted air temperature to over 750-800ºC with a high efficiency (up to 95%) heat recovery system based on the use of ceramic material; all whilst using minimal energy. DCT regenerative oxidiser capacities range from 3.000 to 300.000Nm^3/h. They boast low maintenance costs and consistency of performance across their life time.

www.babcock-wanson.com



Material enters a vacuum conveyor through a pick-up wand, and is discharged through a cyclone separator at the mixer's stationary inlet

process, he estimates the company produces between four to eight batches per eight-hour shift. To keep up with demand a Munson model 700-TS-90-SS with a capacity of 2549l will be added.

Particle size is a big consideration. "Matching and sizing particles is important in blending," Anderson continued. "You can't just blend 841 micron (20 mesh) and 149 micron (100 mesh) material in a standard way and then expect it to run through your other manufacturing equipment without separation," he said. "But with our pilot prove-outs, the Rotary Batch Mixer and our customisation, I can take 149 micron (20 mesh) material, apply some humidity and then slowly apply 149 micron (100 mesh) material, then dry while mixing without separation. That is unique."

Minor additions, such as vitamin D3, must be pre-blended with other materials. Indeed, even pre-blends sometimes need pre-blending. That was the case when Anderson needed to ensure that the same tiny amount of chromium picolinate went into each two-piece capsule. "The mixer's uniform blending enabled us to hold it to within just two micrograms either way of hitting 100 micrograms per capsule," he said. "You have to know what you're doing with raw material, and how to introduce it. It's a science."

Between batches, large doors allow unobstructed interior access for cleaning and visual inspection. Operators steam-clean and sanitise the mixer, and verify with swab tests. According to Anderson, it's not complicated. "The room was built for the mixer and associated equipment, making cleaning much easier than going up on a mezzanine to clean a V-blender."

He also found the unit cost efficient. "Our costs per kilogram or per batch have been greatly reduced. So we're more competitive with novel products that other companies can't offer. Someday this may be the norm, but I think we're years ahead of our time,"

Anderson concluded. "Our process is also scalable and we're also looking at adding a 8,495l Rotary Batch Mixer where we can do much larger blends."

Munson Machinery
www.munsonmachinery.com