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PROCESS WORLDWIDE

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ONE FOR ALL

If everything goes according to plan, a new era in device integration will begin this year. At last everyone is talking the same language: FDI.

Dr. Thomas Wurzel,
Air Liquide Global E&C Solutions:

"Since the first complex went into operation in 2011, we have seen strong interest in Methanol-to-Propylene (MTP) technology outside of China."

Coal-to-Chemical Projects

COAL FOR THE DRAGON

TDI Production

HOMECOMING OF A WONDER MATERIAL

Pumps

CAN CORIOLIS METERS BE USED WITH VANE PUMPS?

Vogel Business Media

Batches of metal powder typically weighing 4,000 kg are loaded into the Munsion Rotary Batch Mixer from an overhead container that is moved into position by a crane.

Pictures: Munsion

BLENDING WITHOUT SEGREGATION

Rotary batch mixer enables an addition to capacity — Blending plays a key role in producing metal powders. The requirements of a Japanese metal powder manufacturer are therefore pretty high. The company demands good blending, complete discharge without segregation and short mixing times even with large capacity.

STEVE KNAUTH*

Nippon Atomized Metal Powders Corporation uses a patented water-jet atomisation process to make high-quality super-fine metal powders from copper, bronze, brass, silver, gold, and stainless steel that are of consistent composition and particle size. Following the water atomisation stage, the resulting metal powders are dried, screened and blended. Each step must be carried out correctly to yield the correct particle size distribution for the planned end-use including electronic components and assemblies.

Avoiding Segregation

The Munson Rotary Batch Mixer plays a key role in producing metal powders having particle sizes from 10 micron up to 500 micron (30 mesh) and specific gravities in the range 1.8–3.5. The mixer's volume is 2.5 m², and typical batch sizes are 4,000–5,000 kg.

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PROCESS-Tip

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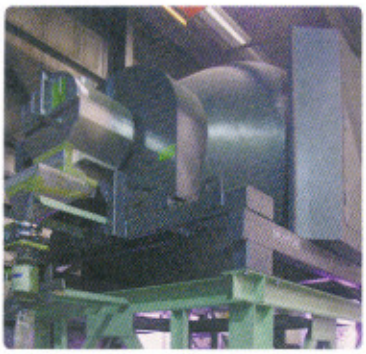


As the Rotary Batch Mixer discharges, particle size distribution remains unchanged, which was not the case with other mixers used by Nippon Atomized Metal Powders.

Worth Knowing Facts

ROTARY BATCH MIXERS AT A GLANCE

Proprietary internal mixing flights create homogenous blends. The gravity driven process produces a rapid, thorough blend while imparting minimal energy and intensity to the product. This maximizes equipment life without sacrificing blend quality. Today's advanced Munson rotary batch mixers are the result of continuous improvement:

- uniform mixing in less than three minutes,
- gentle four-way mixing action: tumble, turn, cut and fold,
- continuous mixing during loading and discharge,
- zero stratification, segregation or densification,
- equally efficient mixing at any capacity, from full down to 1/3 capacity,
- single floor installation,
- uniform impregnation, encapsulation, drying, heating or cooling processes,
- handles dry powder and granular products,
- available equipped for liquid spray additions,
- low horsepower, high mechanical efficiency,
- dust tight design,
- capacities from 5 to 600 ft^3.

"We use the mixer mainly as a homogeniser to avoid material segregation," says Koji Yamamoto. He is General Manager of the R&D division of Nippon Atomized and heads one of the firm's two production divisions. "We need to be sure that particle size distribution is the same across the batch, and from one batch to the next. With the Munson, we get good blending and complete discharge without segregation, and short mixing time, even with the large capacity."

Nippon Atomized purchased the mixer to increase capacity. "Our previous double-cone blender was limited to 1,500 kg per charge," Mr. Yamamoto says, "and a batch took 20 minutes to blend. This was too small and too slow for our production needs. The rotary batch mixer blends up to 5,000 kg in just 5–7 minutes."

The unit's four-way mixing action—tumble, turn, cut and fold—achieves batch uniformity rapidly, and more gently than with agitated blenders. Continuous rotation keeps material in motion at all times, preventing particle-size segregation during discharge.

Convincing Performance

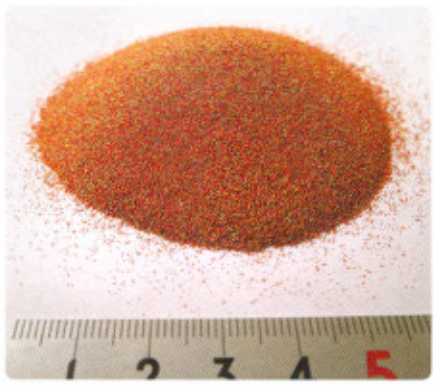
Yamamoto says Nippon Atomized Metal Powders imported a mixer because, "We wanted complete discharge without segregation, plus large capacity. There are no Japanese mixers that combine these important features." The Japanese powder metallurgy industry mostly uses V-blenders and double-cone blenders, Yamamoto explains. These mixer types provide complete discharge, but on discharge there tends to be segregation of particle sizes: "In general, the particle size distribution moves from fine to coarse as the mixer is discharged. The Munson mixer avoids this problem."

Headroom is tight, says Yamamoto, and it was a challenge to fit everything into the available space, as the mixer is loaded from an overhead container that is moved into position by a crane. Customer acceptance was also an issue, he says, and even now some customers are reluctant to change to the offshore mixer for their products. But any initial headaches were well worthwhile, Yamamoto says, with the mixer proving both effective and reliable after nearly three years in operation.

For Easy Product Changes

When a change of grade is required, cleaning is straightforward; a small quantity of the new product is used to clean the mixer and is then recycled. "And we don't have to worry about maintenance," Yamamoto says. "With our previous mixer, the design of the machine caused a lot of trouble with the axle and the drive chain. As long as the drum alignment is okay, the rotary batch mixer is trouble-free, and the quality of blending means lower costs for quality control."

Copper-tin pre-alloyed bronze powder for diamond cutting is the finest (20–30 micron) homogenised in the 2.5 cu m capacity rotary batch mixer



Pure copper powder, the coarsest powder processed in the rotary batch mixer, ranges from 85–100 micron.

Nippon Atomized Metal Powders' main product for oil-less bearings is partially premixed copper-tin bronze powder.