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CELEBRATING 20 YEARS

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- Automated batching

WEIGHING AND BATCHING



Case history

Rotary batch blender takes on the competition

To remain competitive in the powdered metal industry, a company installs a rotary batch blender so it can move its metal powder blending operation in-house.

Mi-Tech Metals Inc., Indianapolis, produces tungsten heavy-alloy blanks and machine parts for use in the mining, oil, automotive, aerospace, medical, military, and other industries. The company uses various metal powder blends as the raw materials for making boring bars, grinding quills, counterbalances, gyro rotors, flywheels, and other parts. In the past, the company used small quantities of metal powders blended in-house and large quantities of pre-blended metal powders purchased from a toll processor. As competition within the industry grew and product

demand increased, the company realized that it needed to find a way to bring the metal powder blending operation in-house to remain competitive and continue to meet customer demands.

Making changes to stay competitive

To make a finished part, the company puts a specific metal powder blend into the appropriate compacting dies and compacts the powder. The compacts are removed from the dies and heated in an indirect resistance fur-



The blender's mixing drum starts rotating before the surge hopper (top, red) discharges the metal powders into it.

nance at liquid-phase sintering temperatures until complete. The sintered parts can be machined or shipped to the customer as is.

For more than 20 years, the company purchased the majority of its metal powders from a toll processor, which mixed together various quantities of tungsten, copper, nickel, and iron powders as specified by the company. The toll processor packaged the preblended powders in bulk bags and shipped them to the company. Over time, many of the company's competitors changed their operation and production methods to become more efficient and economical. Mi-Tech knew it had to do this, too. So in 2000, the company decided to reassess its operation.

"We realized that we needed to upgrade the metal powder blending operation and bring it all in-house," says Ross Stahl, director of engineering at Mi-Tech Metals. "The small-capacity tumble mixers we used for small batches were inefficient and required long blending times, so we knew they wouldn't be able to handle the capacity we needed.

"In addition, pretty much everyone in the industry had moved to blending their own metal powders in-house, except us. And it was becoming more expensive for us to use the toll processor because of continually rising processing and shipping costs. Also, by having to rely on the toll processor for most of the powder blends, there were

"We were looking for a large-capacity blender that could successfully blend a number of metal powders that have a wide range of particle sizes and bulk densities."



After blending for several minutes, the blender's discharge gate opens and the homogeneously blended metal powders discharge into a bulk drum.

times when a certain blend would run low and we'd have to wait to complete a job until we received more from them."

Finding the right equipment

The company contacted three blender suppliers for information about industrial rotary batch blenders. After reviewing the information and discussing Mi-Tech's needs with the

three suppliers, the company focused on a blender manufactured by Munson Machinery, Utica, N.Y., which supplies a wide range of dry-blending, size reduction, and metal-finishing equipment to the bulk solids and other industries.

"We were looking for a large-capacity blender that could successfully blend a number of metal powders that have a wide range of particle sizes and bulk



An operator (left) positions a bulk drum under the blender's discharge, while another operator (right) calls up a preprogrammed recipe on the blender's control panel.

densities," says Stahl. "The blender had to be able to produce a one-hundred percent homogeneous blend in a short time and completely discharge the blended powders without segregation occurring. The blender also had to be easy to clean out when required. We decided to work with the supplier to see if their blender met all of our requirements."

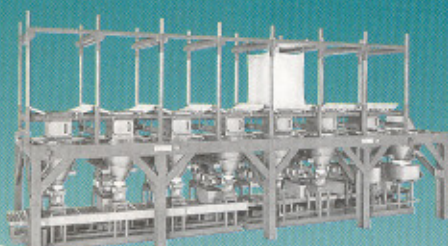
The company sent several different metal powders to the supplier's test lab, and Stahl and other company engineers traveled to the lab to witness the tests. "We were there for two days and observed various tests using a full-size lab rotary batch blender, which is a smaller version of the blender we were interested in," says Stahl. "Since their blender met our requirements and would work well for our application, we decided to purchase one of their rotary batch blenders."

The rotary batch blender

The company purchased one model 700-THX-25-MS extra-heavy-duty rotary batch blender, which is constructed of carbon steel. The 25-cubic-foot-capacity blender can hold up to 5,500 pounds of the high-density metal powders, and its 20-horse-

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power motor rotates the batch mixing drum between 10 and 11 rpm. A self-adjusting face seal ensures dust-free operation. Continuously welded lifters and baffles inside the mixing drum create a rapid but gentle mixing action that fluidizes the material. The supplier reinforced the internal baffles to prevent Mi-Tech's heavy metal powders from bending and potentially breaking them.

The mixing drum continuously rotates during the fill, mix, and discharge stages. "During operation, the lifters and baffles gently lift, fold, and tumble the material onto itself while directing it to the mixing drum's discharge end," says Stephen Mullin, regional sales manager for Munson Machinery. "When the discharge gate is closed, the material is redirected back toward the mixing drum's cylindrical section where the gentle blending action occurs. This is how the blender can achieve a homogeneous blend in such a short time."

Whether a company is blending granular or very fine materials, all of the particles will be completely dispersed and blended, regardless of the number of different powders, their bulk densities and particle sizes, and the different percentages of each powder. Mullin says, "You can add one-tenth of one percent of a minor ingredient to a batch and it will still be completely and homogeneously dispersed at the end of the mixing cycle."

To discharge the material, the blender's discharge gate opens about 60 degrees and the material quickly and completely discharges from the mixing drum without segregation. For Mi-Tech's application, the batch is capable of complete discharge in less than 60 seconds.

Mi-Tech designed and engineered a structural stand that supports the blender as well as a control system, pneumatic conveying system, and discharge system. "We had an engineering firm and local contractor manufacture and install everything

for us," says Stahl. "For the control system, we have preprogrammed recipes that allow an operator to choose a specific blend with the touch of a button. After hitting Start, the whole blending process is automated: The pneumatic conveying system moves each powder from its storage vessel to a surge hopper above the blender's inlet for staging. Because the metal powders are so heavy, the mixing drum starts rotating while it's empty to put less stress on the

blender's motor. Once the drum is rotating, the surge hopper discharges the powders into it. After the appropriate time, the blender's discharge gate opens and the batch discharges as a completely homogeneous blend into a bulk drum."

The blender takes several minutes to blend the various metal powders. But Stahl says the new blend times are much shorter than the blend times for

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the smaller tumble mixers the company used to use: "Now we're blending up to seven times more powder in one batch in less time than before. So the new blender is a huge time saver."

The blender is also easy to clean, says Stahl: "We use compressed air and just blow out the mixing drum. In fact, we don't have to clean out a mixing drum after every batch run because the blender discharges nearly one hundred percent of the material every time."

Maintaining competitiveness

Since installing the blender, says Stahl, "We've seen a substantial cost savings, which makes us more competitive in the market. We've decreased the cost of producing our products because we've eliminated the toll processor and related shipping costs. We're able to blend more powder in less time, and that's helped us maintain inventory without worrying about shortages. Additionally, the

blender is easy for the operators to use, and they spend a lot less time monitoring and operating the blender than they did with the tumble mixers."

"We've seen a substantial cost savings since installing the blender, which makes us more competitive in the market."

The new blender has helped streamline the company's operation. "In the past, we had one operator who worked at the tumble mixers blending metal powders full time," says Stahl. "Whereas now, that same operator spends a great deal of time working in other areas in the department. So the new blender has increased the department's efficiencies."

The blender hasn't increased the company's energy costs, says Mullin.

"The blender is very energy-efficient in comparison to a horizontal agitated mixer, like a ribbon blender, which typically requires two-thirds more energy to get the agitator to turn with such heavy materials as the metal powders Mi-Tech is blending. And because of the blender's gentle blending action, the company doesn't have to worry about the metal powders abrading the blender's carbon steel components, so it pretty much provides maintenance-free operation."

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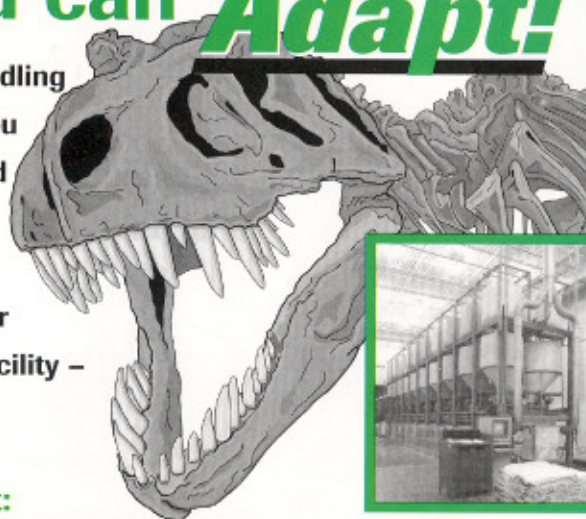
Note: To find other articles on this topic, look under "Mixing and blending" in *Powder and Bulk Engineering's* Article Index at www.powderbulk.com or in the December 2006 issue.

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